Assessing the effectiveness of climate change programmes and project implementation in Papua New Guinea

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by

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Abstract

Papua New Guinea has faced a challenge to subsistence livelihoods caused by the rapidly changing climate since the early 1990s. In response to the challenges, PNG has adopted and promoted the adaptation concept since 2007. The adaptation initiatives have taken place at various levels, by a number of responsible groups and institutions: state institutions have targeted policy development while the local communities have initiated projects to overcome the changing environment. Since the programmes and projects happen at various levels, this study aims to assess and gain insights into the experiences of those stakeholders who are directly involved in implementation, to see whether community projects complement or challenge government programmes. A case study approach to data gathering was employed to gain qualitative insights into the challenges and opportunities experienced. In-depth interviews, general observations, and online questionnaires were employed for primary data collection. Data collected were analysed to identify the common issues experienced. The study found that community initiated projects do not intuitively correlate with government established programmes. There is no clear mechanism established between government and communities to work in partnership to address climate change impacts at the community level. Communities initiate and implement projects based on their own local knowledge and circumstances. To encourage and enable communities to achieve the maximum expected outcome, state institutions and other stakeholders would need to support and build skills and technical capacity. Such an effort would require the integration of different stakeholders' programmes so that effectiveness can be achieved through coordinated efforts.

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Table of Contents

List of Tables

List of Figures

Appendices

Acronyms

ADB	Asian Development Bank
AOSIS	Alliance of Small Island Nations
AusAid	Australian Development Aid
BPNG	Bank of Papua New Guinea
CELCOR	Center for Environmental Law & Community Rights
CO_2	Carbon dioxide
DAL	Department of Agriculture and Livestock
DEC	Department of Environment and Conservation
DNPM	Department of National Planning and Monitoring
DPLLGA	Department of Provincial & Local Level Government Affairs
ENSO	El Nino Southern Oscillation
EU	European Union
GHG	greenhouse gas
GoAustralia	Government of Australia
GoPNG	Government of Papua New Guinea
IFRC	International Federation of Red Cross
INC	Intergovernmental Negotiation Committee
IPCC	Intergovernmental Panel on Climate Change

IPO	Interdecadal Pacific Oscillation
ITCZ	Inter Tropical Convergence Zone
LDCs	Least Developed Countries
LLG	Local Level Government
LMMA	Locally Managed Marine Areas
NAPAs	National Adaptation Programme of Actions
NARI	National Agricultural Research Institute
NGO	Nongovernment Organisation
NSW	New South Wales-Australia
NZAid	New Zealand Development Aid
OCCD	Office of Climate Change and Development
OKPF	OnaKeto Peoples Foundation
PNG	Papua New Guinea
PNGEFF	Papua New Guinea Eco-forestry Forum
PwM	Partners with Melanesians
REDD	Reducing Emissions from Deforestation and forest Degradation
RCF	Research and Conservation Foundation
SPCZ	South Pacific Convergence Zone
TNC	The Nature Conservancy
UN	United Nations
UNEP	United Nation Environment Programme
UNFCCC	United Nation Framework on Climate Change Conventions
UPNG	University of Papua New Guinea
USA	United States of America
WB	World Bank
WCS	Wildlife Conservation Society
WWF	Worldwide Fund for Nature

Chapter 1: Introduction

1.1 Background to research - climate change in Papua New Guinea

Climate change is a "hot topic" in the 21st century as climate related disasters become more prevalent, with many devastating impacts. In recent times for instance, floods have destroyed communities in Queensland, inland New South Wales and parts of Victoria in Australia because of continuous heavy rainfall of more than a week, related to intense La Nina conditions. Similarly in January 2011, the worst monsoon flooding ever experienced in Pakistan was believed to be a direct result of the increasingly warm atmospheric temperature within the region (Walsh, 2011). More climate related disaster events have been experienced in countries like Mali and throughout Sub Saharan Africa. There were similar events in the late 1970s and the early 1980s. Such events may be climate change related while some are climate cyclical (IPCC, 2007). However, a recent study by Mertz et al. (2009:745) and the UN General Secretary (August 2011) asserted that the prolonged dry season in Africa was part of climate change. Likewise the cyclone and flooding effects in the Philippines and Thailand are considered to be caused by increasing temperatures experienced within the tropics due to global warming (UNISDR, 2011).

These events have been described by climatologists as the direct effect of global warming, and many have predicted more disastrous events will recur within a short span of time. From socioeconomic and political perspectives, some political leaders have described such events as having detrimental impacts on the wellbeing of human lives. For example, the Pakistan flooding disaster was stressed by the UN Secretary General as more disastrous and affecting the livelihoods of many more people than ever before, while the Prime Minister of Australia has claimed the flooding impact as the most extreme in seventy years (Government of Queensland, n.d). More reports of climate related disasters that are happening elsewhere have been reported in print and digital media. The European heat-wave of 2003 is another case example. This covered large parts of Europe, extending from June to mid August, with an increased temperature of plus seven degrees Celsius over monthly mean temperatures. The IPCC[1] (2007) believes that increases in monthly mean temperatures and carbon dioxide concentration will eventually force the mean climatic conditions to change so that the earth faces irreversible and catastrophic system feedback. Thus the consensus view from many countries in the years since 2007 is that global average anthropogenic greenhouse gas emissions should be cut down to as low as 50 percent by the year 2050 (IPCC, 2007).

The discussions on the idea of cutting down greenhouse gases are still ongoing, while examples of impacts experienced are prevalent in both first and third world countries. However, it is highly likely that the societies in the first world will be more resilient than

[1] The Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change and provides the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts (http://www.ipcc.ch/organization/organization.shtml).

developing ones. This may be the case because first world nations have the finance and improved technologies to enable them to adapt to climatic adversities, whereas the developing nations are disadvantaged in these terms. Papua New Guinea (PNG) for example, is a developing island nation and there are reports of increasing incidences of malaria outbreaks in the highlands (cooler) regions due to increasing monthly mean temperatures in recent times. Additionally, the prolonged dry season of 1997 (lasting almost a year) caused a country-wide drought while heavy rainfall and flooding were recorded in some parts of the country which had never previously experienced them (AusAid, 2007; DNPM, 2010a; World Bank, 2011:2; NARI, 2011). Such changes in weather patterns, degradation in biodiversity and disturbance to livelihoods are an obvious indication that climate change is happening. However, as the impact of changing climate varies from place to place, so does the response mechanism employed to reduce the impacts. To help understand PNG's country situation, section 1.2 provides an overview of the geographical, social, political and economic information on how PNG is positioned to address climate and adaptation issues in a profound manner. Chapters 2 and 3 will then provide an overview of the conceptual frameworks of climate change and the political influence PNG has abroad, and assess the priority climate change response initiatives it should take.

1.2 Country overview

Geographically, Papua New Guinea is situated in the south-west region of the Pacific basin to the north of Australia. It has a total land mass of 461 690 square kilometres with

600 smaller islands and archipelagos. Of the 600 islands, there are four main ones (Manus, New Britain, Bougainville and New Ireland - Figure 1-1) that have a provincial status of their own. PNG is the largest of the Pacific Island States and shares a political land boundary with Indonesia (West Papua) to the west (Kini, 2010; National Strategic Plan Taskforce, 2011). Furthermore, PNG has a geographically rough terrain with 'vast mountains and valleys running through the middle of the mainland' (Reilly, 2000:174). Such a geophysical nature creates severe difficulties in terms of isolation, access and transport.

The country also contains many language and cultural groups. There are over 850 languages spoken while English, Neomelanesian Pidgin and Motu form the main means of communication and business. Politically, PNG is governed by the Westminster system with a central government and 22 provinces. It has a unicameral chamber with 109 elected seats. Religiously it is predominantly Christian (National Strategic Plan Taskforce, 2011:15). The national population is growing at the rate of 3.2 percent with the current population at 6.7 million. The bulk of this population, 85 percent, lives in rural areas with the balance in urban or suburban areas (Wickham, et al., 2010; World Bank, 2010). The majority of the rural based population is engaged in subsistence economic activities (Bourke, 2001), while the national economy is supported through the export of gold, copper, oil, coffee, copra, coca, palm oil and forest, including marine products (Webster & Duncan, 2010; BPNG, June 2011).

Because of the mainly rural based population and the declining national economic performance in recent years (Webster & Duncan, 2010), responding to climate change poses an additional problem. Hence, this study attempts to assess the actions that are taking place to reduce vulnerability. Sections 1.3 to 1.7 elaborate in detail the reasons why this study has been undertaken.

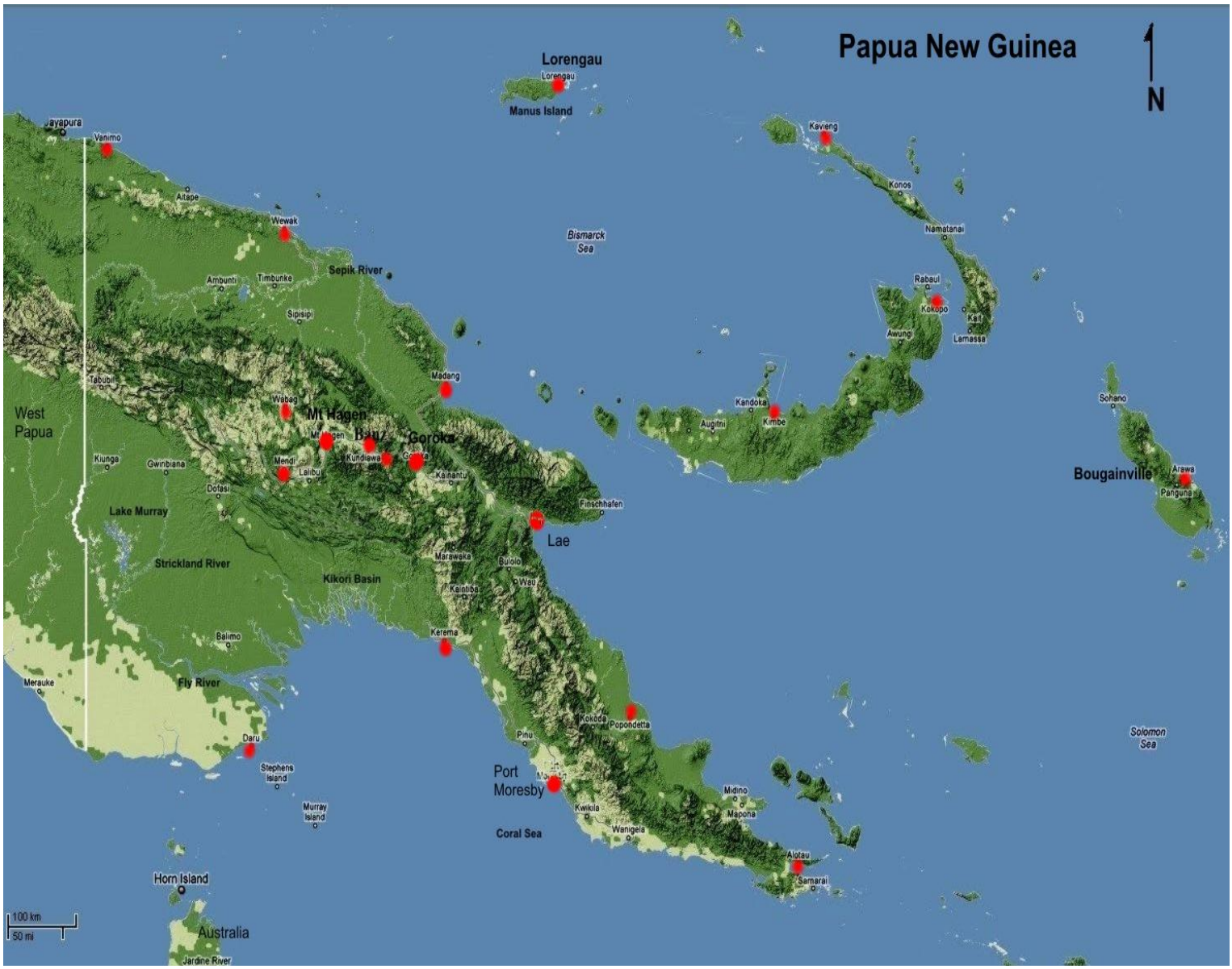

Figure 1-1: Map of Papua New Guinea with the names of provincial capitals (map modified from a Google map, January 2012).

1.3 Research aim and objectives

The aim of this study is to gain insights into the implementation of climate change adaptation programmes and projects in Papua New Guinea. At the same time, it will provide new information around experiences and understanding of five different stakeholder[2] groups which are directly participating in climate change programmes. Furthermore it will seek to contribute to the information that practitioners, decision-makers, and policy-makers need for better planning in the future.

In order to achieve this aim, three main research objectives guided this study. These are:

(1) To investigate the climate change knowledge and issues at international, national and community levels.

(2) To understand the adaptation strategies that the funding agencies, national government agencies, NGOs and government program offices and the local communities have for implementation in PNG.

(3) To identify the most important variables that can make vulnerable communities in PNG be more responsive to climate change in the future.

[2] In this study, stakeholders are groups and institutions such as local communities, NGOs, private sector, Church and Statutory bodies.

1.4 Rationale for this study and the selection of case studies

Since PNG started taking the initiative in 2008 to address climate change issues locally (DNPM, 2010a), the government has focused mainly on setting up policy frameworks. However, no climate adaptation projects were initiated until mid 2009, when some of the rural communities, with support from NGOs, decided to start some projects that were related to livelihood issues across the country.

These projects were initiated based on local circumstances, and are significant to explore, because as pioneer climate change adaptation projects, they will have experiences which may be shared. These experiences could show some indications as to whether international funding agencies and government initiated frameworks are having impacts in the areas that they intend to support. This research therefore identified the two projects which had advanced most in their adaptation activities. Furthermore, the two projects were selected based on contrasting geographical settings as well as approaches to adaptation. As can be seen in Figure 1-2, the Ona Keto reforestation project is highlands based (situated at an altitude of about 1800m above sea level), while the Pere community project is coastal and marine based (Figure 1-3). Ona Keto is involved in replanting trees to help in carbon dioxide absorption, and prevention of landslides and restoration of biodiversity to maintain livelihoods. The main objective of the project is to prepare the communities to contribute to mitigating as well as adapting to the climate changes. The Pere project is marine-based and its target is to protect coastal shoreline erosion through

mangrove planting, protection of coral reefs and growing of drought and saline resistant food crops.

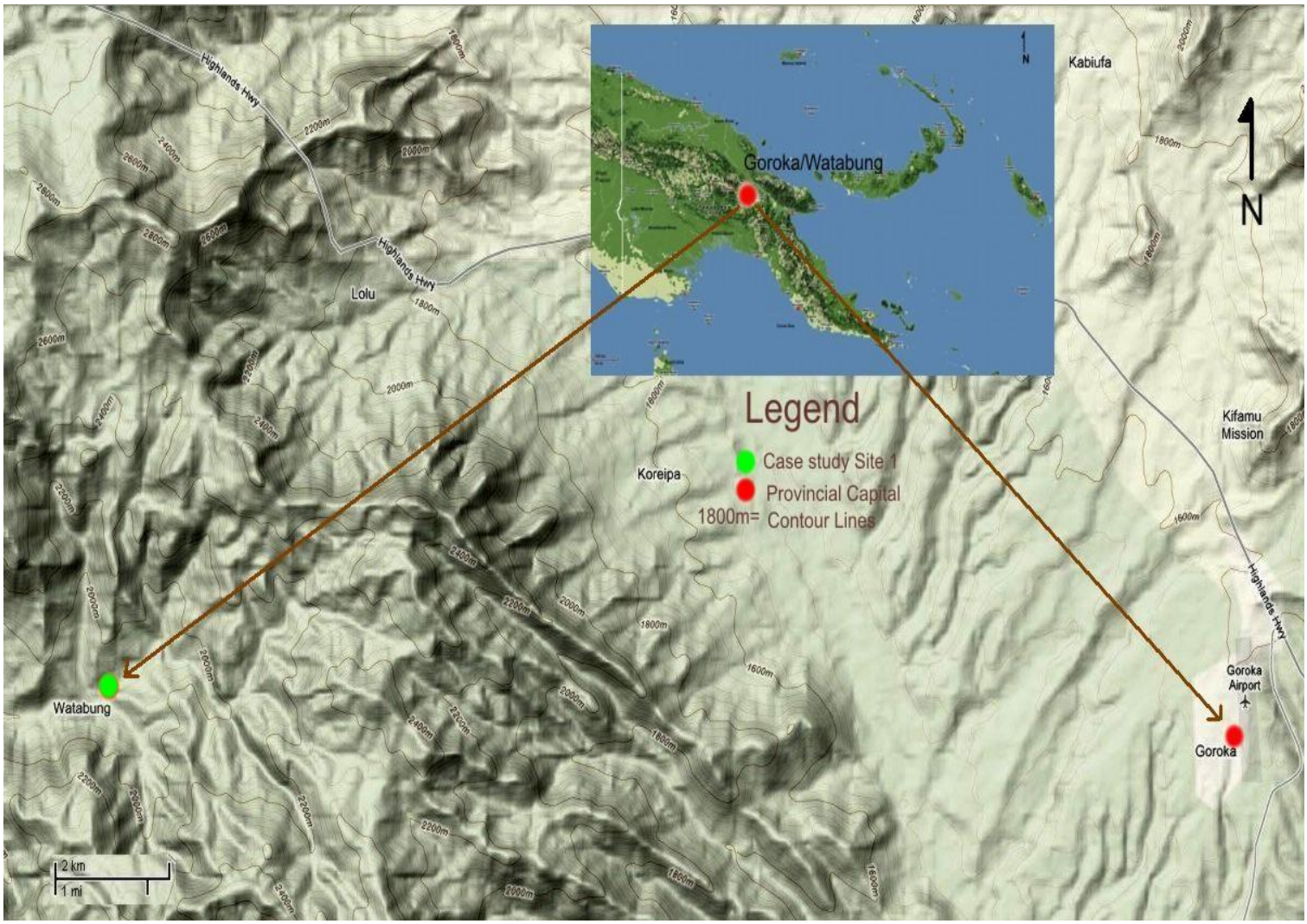

Figure 1-2: Location map of OnaKeto villages (Kenangi, Fatau and Mangiro) in Watabung District of Eastern Highlands Province where the interviews were conducted (map modified from a Google map, January 2012).

It is considered that the experiences of these two projects will be helpful in identification of the weaknesses and strengths in the way climate change adaptation projects are being implemented in PNG. Furthermore, the projects would also highlight the best approach in

community oriented climate change projects; hence, they will provide the opportunity for similar projects to be implemented more successfully elsewhere.

Figure 1-3: Location map of Pere village, Manus Province where interviews were conducted (map modified from a Google map, January 2012).

1.5 Scope of the study

The scope of this study is to seek qualitative insights into the experiences of climate change implementation programmes and projects in PNG. In particular, it seeks insights into the way the implementation aspect is carried out, by comparing the policy frameworks that are established by the government of PNG with community implemented projects. As such, the study focused on:

- Gathering insights and in-depth experiences from two case study projects with contrasting geographical boundaries.
- The views discussed in this study are mostly from key stakeholders that participate in PNG's climate change adaptation programmes and projects: the international funding agencies; the government departments of PNG, programme offices and research institutions that are set up by the PNG government; the NGOs; and community-based organizations.

1.6 Outline of the thesis and organization of chapters

This thesis is presented in eight chapters. Part 1 includes the Setting up Section while Parts 2 and 3 are the Findings and Conclusion Sections respectively. The Setting up Section is contained in Chapters 2 to 4. Chapter 2 provides the conceptual background relating to climate change in PNG and discusses enabling mechanisms for stakeholder

collaboration for successful project implementation. It also tries to clarify the complexity of the definition of climate change adaptation and the justification of its meaning in the PNG context.

Chapter 3 analyses PNG's strengths and weaknesses in international climate change dealings and debates, the viable option for national climate action and the reasons why its government works closely with NGOs in implementing adaptation activities.

Chapter 4 discusses the methodological approach taken. It outlines the number of considerations undertaken to gather field data. Most importantly, it was designed to ensure the research met ethical standards; an appropriate questionnaire was designed and data collected and analysed for presentation.

Part 2 presents the findings of this study. This part is divided into three main chapters presenting the field work carried out with each research participant and focusing on the main themes that stand out from the participants' experiences of adaptation initiatives in PNG.

Part 3, Chapter 8, provides a summary of the research and its implications, reflections on climate change adaptation projects in PNG; and draws conclusions from the study while acknowledging follow up studies in future.

1.7 Research interests and self confessions

A good qualitative study is one which 'reflects the history, culture and personal experiences of the researcher' (Cresswell, 2007:46). Research interest and self confessions in this study are more than simply an autobiography. With me as the main thrust of the data collection and analysis throughout the research I acknowledge that I bring certain values and insights from my experiences in working on biodiversity conservation and resource management as a Papua New Guinean, which could influence the manner in which data is collected and interpreted. Nevertheless I will introduce myself and what I have been doing before taking up postgraduate studies, to clarify the ways in which I could influence the research process and how I managed these.

I was born and brought-up in the rural Wahgi Valley near Banz township of Papua New Guinea. I spent my childhood days on this great plain surrounded by the Kubor Range to the South and the Bismarck Range to the North (figure 1-4). My experiences of life and the surroundings were mainly rural until I went to a boarding high school some ten kilometres away from my village. Being away from home and my parents for the first time made me long for my beautiful rural setting and it was at this time that I came to appreciate and love the environment in which I was brought up.

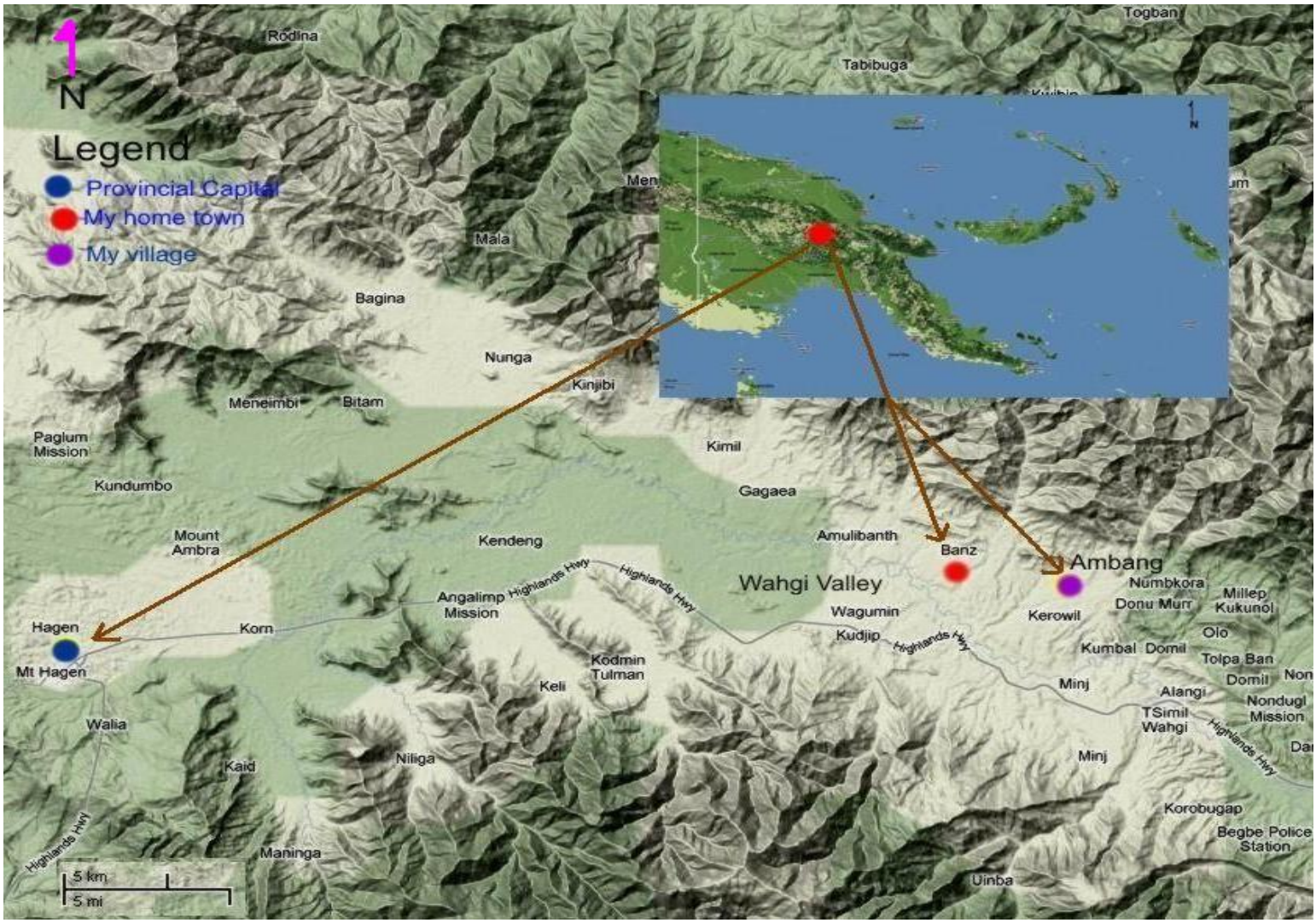

Figure 1-4: Location map of my home township where I was raised and started my high school education (map modified from a Google map, January 2012).

My interest in the natural environment and the sustenance of the rural livelihood strengthened when I went to senior high school, which was far away from home. I started to develop a deep sense of appreciating life and the function of the ecosystem, which enabled me to take an Environmental Science course at the University of Papua New Guinea. UPNG is situated in Port Moresby, the nation's capital (see figure 1-1). During this time, the Environmental Science course was one of the first courses introduced to UPNG in 1991 and I was in the second intake for this course.

Taking this course further strengthened my hope of helping my community and country to keep the environment, which is its life supporting system, safe and healthy for people's survival. During the years 1994 to 1995, while I was in my third and final year of studies, there was an ongoing movement in PNG and abroad for environmental sustainability. There were discussions under the auspices of the United Nations where a declaration was made in Rio de Janeiro in 1992 to protect and conserve biodiversity in an attempt to maintain the ecosystem.

These movements prompted the government of PNG and the United Nation Environment Programme to develop and introduce the concept of an "integrated conservation and development programme". This was a programme that could be trialled in PNG because of customary land tenureship, where the local landowners want socioeconomic development provided the environment and its biodiversity can be conserved. At the same time, there was a growing movement by environmental NGOs in PNG to take a complementary role to help the government's Department of Environment and Conservation to implement the integrated conservation and development programme.

I was one of the few graduates who were recruited straight from the university and was assigned to a field officer position with Conservation Melanesia, a national NGO, as the government did not have sufficient resources to employ all of us. It was with the NGO that I gained many insights into networking, liaison and collaborating with partners and the like-minded to address the environment sustainability issue on a greater scale. By 'the

greater-scale' I mean developing plans, identifying programme and project activities, writing proposals to donors for funding support, communicating the information to the host communities, conducting training to build their capacities and execute planned activities to achieve the anticipated project or programme goals.

I held a number of senior positions in NGO circles and also helped many rural communities throughout PNG. In those positions, I experienced numerous highs and lows while working in the field. I was dismayed when seeing that the important pillars such as income generation opportunities, health and education facilities, transportation and communication networks that constitute a sustainable livelihood were not adequately addressed by any means or interventions. This was attributed to the PNG government's lack of financial and skilled people to take on the issues and address them profoundly. In this case, there was little attention given to help the remote and severely impacted people whenever there was a resource made available. The issue of funding and having skilled persons to help rural people plan and make decisions on how they can improve their livelihoods remained the same after I left for postgraduate studies to further my career. To this day I know that PNG is far behind in addressing the growing social, environmental and economic issues, because of the lack of priority given to them by respective governments over time.

Given that PNG cannot address its own natural and human-induced disasters effectively, climate change, a global phenomenon, is an added problem for the country. It is of huge concern because it will affect both human and socio-economic welfare. As such I want to

contribute in any way possible to support the PNG Government's policies by identifying deficiencies in addressing climate change issues, and especially in identifying effective ways of addressing the climate change issues in PNG.

Chapter 2: Conceptual frameworks for understanding climate change in PNG and enabling mechanisms for successful adaptation: a review

This chapter discusses the theory and conceptual frameworks for understanding the climate change adaptation situation in PNG. It is divided into five main sections. Section 2.1 points out the complex definition of "adaptation", a concept that is central to this research, while section 2.2 provides an overview of the climate change issue in PNG. Section 2.3 presents an overview of the current political system and its service delivery mechanisms. Section 2.4 describes the advantages and benefits of community driven climate change adaptation compared to centrally driven. Essentially the views discussed in this section will highlight the need for reconstructing the notion of development and sustainability in PNG. Thus, the commonly held "top-down" planning would be complemented by creating an avenue for communities to initiate and take ownership. The chapter is summarized and concludes in section 2.5.

2.1 The meaning of climate change adaptation and its conceptual issues: a PNG perspective

The central theme for this study is climate change adaptation and the literature selected for review is mainly focused on adaptation issues and experiences. It is therefore important to discuss the use of the term 'adaptation'.

Adaptation to climate change is a 'broad concept' (Mercer, 2010:249) and may have various meanings. Mertz and others (2009:746) alluded to the review by Smit and others (2000) which stated that there are many similarities in the various definitions. The general definition as presented by Smit and Pilifosova (2001) was accepted by the IPCC's Third Assessment Working Group II as 'adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts' (Mertz, et al., 2009:744) The definition used in IPCC's Fourth Assessment Report was that 'adaptation comprises actions to reduce vulnerability or enhance resilience' (Mertz, et al., 2009:744). Others have described adaptation as actions taken to adjust to the consequences of climate change, either before or after impacts are experienced (Lemos, Boyd, Tompkins, Osbahr & Liverman, 2007; Nelson, Adger, & Brown, 2007; Stringer, et al., 2009). Adaptation is thus far a process of deliberate change in anticipation of, or in reaction to, external stimuli and stresses (Nelson, et al., 2007). Hence in conceptual form, 'adaptation is about decision-making process and the set of actions undertaken to maintain the capacity to deal with future change or perturbations to a social-ecological system without undergoing significant changes in functions, structural

identity, or feedbacks of that system while maintaining the option to develop' (Nelson et al., 2007:397).

All the definitions given by different climate and social scientists are interrelated and relate well to many the purpose of promoting or engaging in climate change adaptation activities. Like many other societies, Papua New Guinean communities have adapted for centuries to climatic trends and extremes (Mercer, 2010: 247). Across the world, people have adapted to climate change over time and will continue to do so in the current situation because climate is part of the wider environmental landscape of human habitation (Adger, 2003:388). However, it is important to note as well that adaptation varies at different scales. For example, at the community level, it will include strategies to improve 'agricultural systems such as crop diversification, or introduction of hazard resistant crop varieties; risk assessments and associated plans; the protection of natural resources; early warning systems; education and awareness measures and protection of water resources' (Mercer, 2010:249). At the national level for the least developed nations, it would include the National Adaptation Program of Actions. NAPAs, a UNFCCC established programme for Least Developed Countries (LDCs to identify priority activities that correspond to their urgent and immediate needs to adapt to climate change (UNFCCC, n.d). And the programme aims at provision of technical and financial support to protect vulnerable communities (Mercer, 2010).

Moreover, there is a need to 'understand and demonstrate how adaptation functions as a process and the wider implications of such a process for resilience' (Petra & Kathleen,

2011.1). In many parts of Africa for example, the adaptation discourse is still predominantly focused on responding to the predicted impacts of future climate change rather than addressing the underlying factors that determine chronic poverty, vulnerability, and adaptive capacity, that is, the ability to undertake adaptations or systems changes (Petra & Kathleen, 2011). The situation may be similar for PNG where climate change adaptation is defined as the response to the 'perceived socio-ecological and economic impact the climate would have on their livelihoods' (Mercer, 2010:247).

2.2 Overview of climate change issues in PNG

Papua New Guinea is home to a wide range of ecosystems that includes mountain glaciers, humid tropical rainforests, swampy wetlands and immaculate coral reefs (World Bank, 2011). Its climate is monsoonal with two distinct types. The first are the northwest monsoons which occur from December to March predominantly in the lowland and coastal areas and create high humidity with temperatures ranging from 24 to 35 degrees Celsius. The second are the southwest monsoons, which occur from May to October specifically in the highlands region and create a cooler climate with temperatures ranging from 12 to 28 degrees Celsius with less humidity. The rainfall averages 3000 mm per year for the country (OCCD, 2011). Generally, there is slight seasonal temperature variation (Climate-ZONE.Com, n.d); however, such a climate is highly susceptible to frequent tropical cyclones with heavy rainfall, landslides, flooding and drought (World Bank, 2011).

The climate in PNG is governed by a number of factors, including the trade winds and the movement of the South Pacific Convergent Zone (SPCZ), a zone of high pressure rainfall that migrates across the Pacific south of the equator. Moreover, it is highly variable yearly and is also strongly influenced by El Nino conditions, which bring drought to the drier areas of the country (World Bank, 2011:3). However, despite natural climatic variations, a distinction can be made between climate changes which have happened and those that are expected.

As for the past and the present experiences, indications are that global climatic change has brought some alarming concerns to the people of PNG. The most notable changes and impacts on the people and their environment are experienced in the northern coastline of the country. The northern coastal villages and rural coastal population are vulnerable to coastline flooding and sea level rise (DNPM 2010; World Bank, 2011). The coastal areas, including islands and many coral atolls, are low-lying and it is estimated that 2,000 coastal villages are vulnerable to climate induced flooding risks in the near future (World Bank, 2010).

So far the current changes in global temperature have brought about some significant changes to the weather pattern within the region. For the coastal areas, these changes have caused sea levels to rise, coastal shoreline erosion, inundation of wet lands and sago swamps, and subsequent effects on the livelihood of the coastal communities (DNPM, 2010b). The highlands region on the other hand is experiencing an increase in incidences of malaria and dengue fever outbreaks. Impacts are expected to increase significantly in

the coming years based on studies of the effects of climate change on disease prevalence (Wickham et al., 2010:76; DNPM, 2010b). Furthermore, climate models predict that El Nino Southern Oscillation (ENSO) events - the see-saw pattern of reversing surface air pressure between the eastern and western tropical Pacific (http://www.sciencedaily.com/articles/e/el_nino-southern_oscillation.htm) that triggers prolonged droughts over the land surface. For example, the 1997 ENSO event brought severe hardship to rural people across the country. Similar situation may occur again, and can become more frequent. The ENSO event will also impact oceanic water temperature and will seriously affect marine life. The most affected would be the corals of which bleaching would be a common occurrence (Wickham et al., 2010:76; OCCD, 2010; DNPM, 2010b:4). The 1997 drought that was brought about by the ENSO event demonstrated that agricultural crops can wither, water resources can reduce in quantity, and increase incidence of environmental health problems because they are highly vulnerable to climate variability (Initial National Communication Papua New Guinea, 2000).

More importantly, the socioeconomic and environmental vulnerabilities of the country to predicted climate change impacts and consequences will bring direct risks to local communities. Therefore it could be expected that the incremental costs to be borne by PNG are likely to be significant as a result of climate change related disasters (Wickham et al., 2010:76). Their impact will hinder development and subsequently affect many rural subsistence-based populations as well as compromising the country's ability to meet and sustain the *Millennium Development Goals* (DNPM, 2010a: 5). The MDG is a

strategy established by the United Nations with a set target for every nation to achieve improved socioeconomic standards by the year 2015. Thus, identifying an effective way of addressing vulnerability and adaptation in PNG would set a precedent for protecting human wellbeing.

2.3 The political system

This section highlights the context within which the climate change adaptation programmes and project are implemented while providing an avenue for critiquing the effectiveness of the current system. Essentially, it elaborates on the current and existing political and governance system and analyzes the service delivery mechanism to provide the background information for understanding how the government's planned programmes are implemented in PNG.

2.3.1. PNG's political and governance system

PNG has a parliamentary democratic governance system based on the Westminster model (Wickham et al., 2010) comprising the executive, legislative and the judiciary. Of the three arms of government, the executive arm is important, particularly for discussion in this study. This is so because the executive arm, known as National Executive Council, is headed by the Prime Minister. It is the executive government that has the power to make decisions on the types of services that can be delivered to the people. It also controls the

delivery service mechanism, that is, the bureaucracy which extends from the national departments to district management bodies.

Together with a well defined system of governance and service delivery to the public, PNG also holds the record in developing countries for having 'maintained an unbroken record of democracy' while 'having held competitive elections since 1964' (Reilly & Phillpot, 2002:907). Outwardly, PNG has a stable system of governance. However, at the parliamentary and bureaucratic levels, parliament has also been unstable since 1975. This instability is reflected in successive votes of no-confidence, changes of prime ministers and ministers and, subsequently, the change of departmental heads from the national to district levels. The change in bureaucratic level affects the delivery of services because, most often cronies are appointed to a senior position without merit. Potentially these changes and appointments have impeded the implementation of planned programmes because, whenever someone new came in, he or she has had differing views and practice to instill and implement, hence cannot continue from its predecessor. Ironically it has led to unstable management of the nation's socioeconomic, political and other aspects of development (DNPM, 2010a, 2010b; Initial National Communication Papua New Guinea, 2000; Wickham, et al., 2010).

Moreover, socio-cultural and geographical isolation play an important role in the instability of parliament. PNG is culturally complex, geographically isolated with much rough terrain and, more importantly, has a complex sociopolitical setting (Conyers, 1976). Because of these sociopolitical differences compounded by a geo-physical setting,

it has not been possible for basic services to reach all the rural populace. In an attempt to overcome this problem the government has established a decentralized system of governance. The main purpose of decentralization as articulated in the Organic Law on Provincial and Local Level Government of 1977 was the division of the powers and responsibilities of government among national, provincial and local levels. This is a critical element of Papua New Guinea's political and administrative structure, and one which has important implications for governance generally and for service delivery in all sectors of government (Axline, 1986). However, this system of governance is described as very complex and costly to run effectively (Wickham, et al., 2010).

2.3.2. The government's service delivery mechanism

The service delivery mechanism in this context refers to the system of administrative governance established by the government of PNG to deliver goods and services to the people in a coordinated manner. The following discussion provides a description of the working of the delivery system. PNG has maintained a decentralized form of governance since independence. The central government has exclusive powers in foreign affairs, defence and matters of national concern. Furthermore, it has the executive powers to make and implement policies, while the provincial and district governments, on the other hand, have delegated powers and act upon directions from the National Executive Council (Axline, 1986:62). Given such a legislative arrangement of decentralization, the national government controls the funds and disburses them to provincial governments based on provincial and district five-year rolling plans. The five-year rolling plan

contains the list of deliverables which reflects the central government's medium term development plans. Furthermore, provincial governments, after receiving funding from the national government, then disburse these funds to district and the local level governments based on the budget contained in their five-year rolling plans. The district government plans while incorporating the central government's medium term development strategies, it also includes provincial government's internal activities to service the province. Such an arrangement, ideally, creates an avenue for coordination and management of the nation's development programme activities.

However, although it has set up the provincial and local level governments with significant responsibilities and funds in an attempt to improve service delivery, the government lacks institutional capacity to effectively deliver its programme activities (DNPM, 2004). This is attributed to the poorly developed infrastructure that results in an unequal distribution of services. The road network is limited owing to the remoteness and rugged terrain and many areas are reached by air. However, the poor maintenance resulted in many airstrips being closed (Axline, 1986; Wickham et al., 2010). As a consequence, a large part of the rural sector remains relatively inaccessible, and the lives of the people have changed little from colonial days (Wickham, et al., 2010).

The National Executive Council (NEC) has made an attempt to improve the ineffective service delivery system. In 2008, the NEC set up a legal framework known as 'Determination' under the Department of Provincial and Local-Level Government to help improve service delivery, including accountability for funding of the services (DPLLGA,

2009). The areas for improved service delivery with strategic directions include Education, Health, Infrastructure, Non-renewable Resources, Agriculture, Fisheries, Forestry, Disaster Management, Environment, Community Development, Village Courts, Land Mediation, Commerce and Industry, and Land and Physical Planning (DPLLGA, 2009:1-13). The outcome of these strategies is yet to be made known, but perhaps it provides a guide to ensure there is improvement in the performance of the provincial and local level governments for effective service delivery.

2.4 Overview of the pros and cons of centrally versus community driven projects

Building on discussions of government policy and political system in section 2.3, this section will attempt to untangle the differences between government and community driven projects, with emphasis on understanding development pragmatism in Papua New Guinea. The first part of this section focuses on the centrally (state) driven projects, whilst the section part discusses the pros and cons of community driven project. By definition, the term "centrally driven" is used here to denote projects or initiatives, including those focused on climate change adaptation, which are defined, planned and fully implemented by the central government. In a broader sense, it is initiated by government, with the aim of helping and improving the 'social and economic' well being of a nation (Callaghan & Colton, 2008:931).

In the climate change arena, initial approaches to oversee climate change adaptation are generally framed through policies and developing technology that can reduce vulnerability, or improve skills and knowledge in better land use management for sustainable livelihoods (Ayers & Forsyth, 2009:25). Such an approach is taken by the central agency, which is the arm of the government. In most cases centrally driven projects are focused on policy creation or regulations to build capacity and actions that implement operational decisions (Adger, Arnell & Tompkins, 2005:79; Ayers & Forsyth, 2009:25). The main intention of government driven initiatives are to protect the state's citizens as it is their national responsibility to do so. However, state-led programmes have been criticised by academic observers and community development specialists, when commenting on approaches to climate change adaptation, as overtly focusing on policies and technological developments (Adger, Arnell & Tompkins, 2005). Thus, 'the scale of governance remain bounded' where little consideration is given to acknowledge and support local communities to plan and implement tasks that can enhance risk reduction whilst improving daily sustenance needs on a timely basis (Wilson, 2012:184)

'Community driven', by contrast, is a term used here to describe community-based development activities where people are offered the opportunity to participate in projects that affects their lives (Harvey, Baghri & Reed, 2002; Ayers & Forsyth, 2009; IIED, 2009). Dongier and others (2003:3) have described community driven development (CDD) as a 'process that gives control of decisions and resources to community groups'. Moreover, CDD process treats people as assets and partners in the development process, building on their institutions and resources (Dongier, et al., 2003). Most importantly,

local people know and understand their local situation well, and too, self initiative will lead to taking ownership; management and maintenance of the livelihood support projects (Osbahr, Twyman, Adger & Thomas, 2010)

However, though the people are in control and actively participating in development initiatives that will determine their wellbeing, there also exist challenges and uncertainties. The challenges and uncertainties includes: lack of capacity to respond to or reduce vulnerability and building resilience, if it a disaster related project; most often communities become too dependent on information and expertise from outside that they cannot act upon their own local knowledge (IIED, 2009:23). In such cases, a project can be seen to have been driven by outside influence and often fail to continue when outside expertise is no longer present. From my personal experience during the years 1996 to 2007 as a conservation practitioner, I have witnessed that a lot of community led conservation projects failed because, they depended fairly too much on scientific and community development expertise from elsewhere. When the outside supports are no longer present, the local people could no longer manage to continue with the projects.

Moreover, in CDD communities focus on number of things, especially when people are poor. Their priority varies and they can have number of agendas which in turn cannot prove solvable once the resources such as finance and technical expertise are stretched. For example, as Goklany (1995) describes, they not only concentrate on reducing vulnerability and building resilience, also attempt to address socioeconomic development needs such as improving access to livelihood. Such a divergent view in CDD often

impedes progress (Devina, n.d) and the situation gives opportunity for a credit to be given to government as their projects are implemented without hassle, provided needed funds and expertise are there. That is, government driven projects have specific plans and activities to implement with a set timeframe whilst the communities often lack needed resources such as finance or skilled human resource. At the same time, communities more often cannot settle their disagreement over what task is to be given priority for quite a while especially when conflict of interest exists within the community groups.

Given that both centrally and community driven projects have a fair advantages and disadvantages, a way forward would be to have a wider stakeholder consultation, planning and implementation of initiatives (Callaghan & Colton, 2008). Such a process should help overcome the number of issues discussed in the above paragraphs.

2.5 Chapter summary and conclusion

Climate change has so far affected PNG in many ways. This includes prolonged droughts and the experience of king-tides in the northern parts of the country. It continues to pose a threat to the wellbeing of the nation and humanity. However, in spite of the threats, it is imperative that some proactive approaches be undertaken. As such, this chapter has discussed the way the governance system works to promote appropriate developmental mechanisms for sustainable livelihoods. While stable and improved governance is important, it is equally important as well to acknowledge that the best approach to

making vulnerable communities adaptable to climate change is through the support and promotion of community driven projects.

Community driven projects can prove successful unless the initiative is from the people who are really affected. Hence they know and understand the issue well. In essence they can manage to define and create an adaptive environment for their safe living. Hence, if the government of PNG wants to protect its people, it will have to take a prudent approach in making sure the decentralization system works while creating mechanisms to appreciate and promote community-driven developmental projects. However, the challenge involves in making life easier and better remains. In climate change and adaptation initiatives undertaken by PNG, both at the national and community level, the task of addressing the issue profoundly remains. Some of the critical challenges PNG faces in particular are, climate change politics and the country's obligation to address the key issue that affects the nation is discussed in chapter 3.

Chapter 3: Global climate change politics and PNG's undertakings locally: An analysis

3.1. Introduction

The aim of this chapter is to provide an analytical overview on PNG's role in the international climate debate and the ensuing actions undertaken locally. Section 3.2

discusses PNG's position from the lens of its contributions and the impact it has on the global climate debates and dealings. Then, the importance of the local actions and how PNG is attempting to address the existing climate change issue as a priority are discussed in section 3.3. In this section, a distinction is made between the two common approaches to addressing climate change: adaptation and mitigation so as to highlight the reasons for PNG to give prominence to a particular climate change response action then embarking on both. Section 3.4 discusses the important role environmental NGOs play, both locally, nationally and internationally in climate change adaptation that attracts the government to work closely with them; while section 3.5 sums up the chapter.

3.2. PNG's position in the international climate change debates and dealings

Since the early nineties when the issue of climate change came to the fore, PNG has taken a keen interest, has been actively involved in international discussions and participated in the policy development. For instance, PNG was involved in international negotiations when the UN General Assembly established the Intergovernmental Negotiations Committee (INC). A committee that has more than 150 states and numerous intergovernmental and NGOs, participated in negotiating solutions to climate change impacts (Kaluwin, 2010). PNG has been part of the negotiation team since 1990 and it comes under the political alliance group known as the Alliance of Small Island States (AOSIS). The 'AOSIS has a membership of 43 states and observers drawn from Africa,

Caribbean, Indian Ocean, Mediterranean, Pacific and South China Sea' (Kaluwin, 2010:11).

Being a member of the AOSIS has enabled PNG to be part of the international dealings and debates. Kaluwin (2010:12) states that 'PNG and its AOSIS group was a very influential political bloc during INC sessions, which included other UN agreements' such as biodiversity and the Montreal Protocol. The negotiations on climate change are now under the auspices of the UN Framework on Climate Change Conventions (UNFCCC), a framework adopted by the INC. PNG has been involved in almost every UNFCCC organized meeting. Recently it has played a valuable leadership role in promoting international discussions on reducing emissions from deforestation and forest degradation (GoPNG & GoAustralia, 2009) through establishment of a Coalition of Rainforest Nations. The main focus for the group is to protect tropical rainforest by promoting environmental sustainability through innovative strategies which integrate social, economic, and scientific rationales (www.rainforestcoalition.org/about.aspx).

Moreover, PNG has always taken a keen interest and participated in the majority of the UN sanctions meetings (Kaluwin, 2010). However, a major setback in seeing successful implementation of agreements or recommendations from UN is that honouring the commitments such as cutting down carbon emissions through deforestation or improving technology to improve carbon emission from industrial activities relies much on the industrialized nations. Despite the concerns about impacts of climate change on socioeconomic future, there is no improvement in the current situation. That is, there has

been no major political commitment honoured so far by the developed and industrialized nations. For example, as Benwell (2008:546) argues, 'a range of political considerations determines which environmental targets will be adopted, the means of achieving them and the timing of undertaking'. In other words, the decision to adopt environmental targets and then to choose emissions trading as the means to achieving them is not a straightforward step from scientific and economic theory to policy outcome (Benwell, 2008). Furthermore, Brown (2010:300) supports Benwell's considerations that 'progress on climate change can be achieved only through political and economical convergence'. This means that climate change policy must overlap with other political goals, and that political and technological innovations developed to address climate change must be competitive (Brown, 2010). Hence, CO_2 reduction goals are achieved through political and technological innovation while economic growth is maintained

There is much politicking internationally that hinders progress in climate change policy. Industrialized and developed nations have been reluctant to cut emissions and thus the impacts are expected to increase markedly with the exception of few countries in the UK that have cut their emissions rate quite sharply (Howard, 2009). Some of the main reasons are economic and technological. Economically, 'millions of people around the globe are expected to become refugees, and nearly every government will have to commit more time and money than ever before to meet these climatic challenges' (Howard, 2009:25). Secondly, advances in technologies lead to disparities in information accessing and sharing that sees developing countries making poor decisions when it comes to addressing climate change (Howard, 2009). Because of these reasons, developing

countries like China and India do not want to support the call to reduce carbon emissions because they will not want to halt their growing economy as the changes in their approach to improving their economy would have increase cost while the productivity will be low (Howard, 2009). Thus the issue of finding a common ground to cut CO_2 emissions while maintaining economic growth remains a challenge for both developed and developing nations.

PNG, and other smaller developing nations, are mostly caught in the middle of the politics being played by the industrialized nations. For instance, there have been a number of commitments made in the climate change dealings such as the Kyoto Protocol to reduce Greenhouse Gas (GHG) emissions by 2012. Those commitments have not been honoured except by the European countries and the 2011 UNFCCC meeting in Durban saw progress hitting a stumbling block. China for example, could not agree to cut its GHG emissions to 50 percent by 2050 (UNFCCC, 2011: Durban Climate Change Conference). Conversely, there are some countries such as the European Union which make financial commitments to support developing countries such as PNG to implement some of the climate change agreements. To date there are mix reactions and responses from all the countries towards addressing climate change. Thus the impact of changing climate continuous to grow exponentially and affects both human and environmental wellbeing.

Nevertheless, a particular case example of initiative by the EU was the funding support given to PNG for a climate change adaptation and mitigation project that can enable

people devise strategies to cope with the changing climate (EU, 2007). With such support at hand, PNG has adopted a methodology for reducing emissions from deforestation and forest degradation. REDD is a worldwide programme and is for every rainforest nations to participate. Essentially, REDD programme is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development (http://www.un-redd.org/AboutREDD/tabid/582/Default.aspx). This concept was proposed by PNG in Canada and during COP 11, in 2005. Hence, the adoption and promotion of REDD concept by PNG and other developing rainforest nations was agreed to and recommended for action by the COP 13 meeting in Bali in 2007 (Kaluwin, 2010:21). In order to move forward with implementation of the REDD and other climate change reduction programmes, PNG moved on to establish the Office of Climate Change and Development in 2008. The OCCD was established to develop a national climate change policy and coordinate and facilitate mitigation, adaptation, and other climate change reduction programmes (OCCD, n.d; Kaluwin, 2010). REDD option forms part of both adaptation and mitigation programme as it will help in storing of carbon dioxide; an act that will reduce global warming and reducing sea level rise as well and protecting food supply base for plants and animals to replenish.

These are the positive moves both at the national and international level by the PNG government. However, as Kaluwin (2010:28) argues, the country needs to develop an integrated and comprehensive climate change policy that facilitates and coordinates national, provincial, and international partners, and non-government organizations. While

the political debates are ongoing in all climate talks, PNG will have to take proactive action locally like other countries do to support and protect its citizens. Thus, section 3.3 further discusses the possible option that PNG can take to address climate change locally.

3.3. The viable option for climate change response areas: Mitigation or adaptation

So far PNG has embarked on the two main 'Work Programmes' to address climate variability and its impact through either policy intervention or through direct action. The two approved programmes are adaptation and mitigation, while technology and financing forms part of the programme as a support mechanism (OCCD, n.d). The following sections discuss the differences between adaptation and mitigation and consider whether PNG's main goal in addressing climate change is to target adaptation or mitigation.

Mitigation in climate change is described by IPCC as a 'technological change and substitution that reduces resource inputs and emissions per unit of output. Although several social, economic and technological policy changes would produce an emission reduction, with respect to climate change, mitigation means implementing policies to reduce GHG emissions and enhance sinks' (Metz, Davidson, Bosch, Dave, & Meyer, 2007:annex 1). And "sinks" refers to 'any process, activity or mechanism that removes a greenhouse gas or aerosol, or a precursor of a greenhouse gas or aerosol from the atmosphere' (IPCC, 2007:220). However, the mitigation effort does vary from country to country and across regions and sections. Taking further Metz and others' definition, the

mitigation effort might include emission reductions for sectors and an emissions trading scheme. For PNG, such an effort will come with an economic cost and that includes the purchase and installation of technology that would retain carbon dioxide, while switching to the use of clean energy such as solar, wind turbine and biofuel that is of course expensive compared to the hydrocarbon fuel which is currently used. Certainly there are costs for switching technologies, but the country's own assessment indicates that the initial costs of these measures will eventually be reduced by the co-benefits in terms of reduced air pollution, biodiversity protection and energy security (OCCD, n.d).

While the expected co-benefits are yet to be confirmed and before PNG can opt for mitigation programme as its main approach to address climate change, the main argument posed by this study is that PNG does not contribute significant amounts of the 'most important anthropogenic greenhouse gases' (IPCC, 2007:36) that lead to global warming on the world stage. For example, when comparing the statistics on carbon dioxide emission since 1990 as provided by the UN Statistics Division, PNG's emission is relatively small alongside that of the USA or China. USA for instance, emits around 6094.39 million tonnes, and China emits 6538.37 million tonnes, while PNG and Fiji as least industrialized nations emit 3.37 and 1.46 million. tonnes per year respectively (http://unstats.un.org/unsd/environment/air_co2_emissions.htm). These statistics indicates a huge contrast in GHG emissions between industrialized or developed and the developing nations. Thus, for PNG to accommodate the mitigation approach may seem rather a waste of resources and effort. However, promoting mitigation programme is an excellent approach because there are environmental service benefits to be gained. For

example, through implementation of the REDD concept can enhance forest sinks and biodiversity protection. This approach in turn would support human lives through provision of clean air, water, wildlife and plants for daily sustenance or amenity purposes.

By contrast, adaptation comprises actions to reduce vulnerability or enhance resilience' (Mertz, et al., 2009:744). The adaptation concept itself is regarded as an important approach to protecting the vulnerability and minimising the risks faced by many least developed nations (OCCD, n.d; UNFCCC, 2010). It was agreed as an item for immediate action during UNFCCC's meeting in Copenhagen in 2009 (UNFCCC, 2010). Unfortunately, this agreement including others such as the Kyoto II and REDD which requires action to reduce CO_2 emissions does not have the mechanism to operationalise. But, PNG needs to promote the concept because of the vulnerability and the impacts that are already experienced locally such as vector borne diseases that include malaria, landslides and flooding, coastal shoreline erosion and drought (OCCD, n.d). Perhaps, more importantly PNG would need to build adaptive capacity for the vulnerable communities to adapt to these situations without facing more or extreme difficulties. How this might be done is the focus of the next section. It describes one of the important actors in contributing to the building of adaptive capacity.

3.4. Why PNG Government works with NGOs

Nongovernmental organisations have been playing a prominent role in conjunction with the government in response to climate variability and hazards issues in PNG. Their names and list of programme goals, including their geographical areas of interventions are summarised and presented in Table 3-1. The main focus of this section is to highlight the some of the reasons why PNG government works with NGOs towards addressing climate change and socioeconomic related development issues. In addition to the importance of NGO's work, a brief overview of the contradictions that exists in their programme of work is discussed.

Firstly a distinction is to be made between the NGOs as not all of them perform or have a same mission and goal in their programme of work. In fact, there are many not for profit organisations including churches and civil society groups that come under the definition of an NGO, but in this study the term NGO is used to refer to all environmental and advocacy organisations. They are either local, national or international groups and their role is defined as promoting the interests of groups who do not have either a voice or access to voicing their concerns before governments or in the international arena (Allard & Martinez, 2008) on environment sustainability and climate change. Environmental NGOs are a part of the stakeholder groups (figure 3-1) that have an important role to play in climate change adaptation initiatives throughout the country. And Table 3-1 provides the summary of their areas of intervention, with particular focus is on environmental protection. They are working directly or indirectly with communities impacted by climate change. However, the strengths and weaknesses of their roles and their capabilities in

their targeted issue of concern are discussed in the following paragraphs to put into perspective the reasons why the government's working with them.

Before discussing the strengths of environmental NGOs that work in partnership PNG government, it is equally important to highlight some of the drawbacks as this will be a fair approach to analyzing the aspects in which the government and the local communities work in partnership with NGOs. The drawback in the work of NGO often varies with individual organizations and their geographical areas of interventions. Moreover, their roles are complex and they can be assessed in different ways, but generally, some of the common problems associated with their work are: financial and organizational sustainability, accountability and transparency of their operations; and the credibility of aid sourced by NGOs for their work (Fowler, 2000; Low & Davenport, 2002; Bendell, 2006; Allard & Martinez, 2008). As Low and Davenport (2002) further stated, environmental NGOs are basically donor funded and they do not seem to have local financial support, in particular from local government and business organization to sustain their essential services such as maintenance of projects implementation, and operational costs including staff salary. When such situation exists, many quality project staff leaves. At the same, the work with the people stops. In return the village people are left with incomplete task where they cannot be able to do it themselves because they too lack funds and expertise to do it.

Similarly, criticisms have been level against NGOs for 'misuse and abuse' of funds as well as being labeled as involving themselves in unethical behaviors such as paying high salaries to executive officer including expenses for officers, travel and other perks

(Bendell, 2006:ix). Such criticisms are serious and in most cases demote the cooperation from local people and groups who support the project implementation. There are other concerns on, conflict of interest and lack of transparency in the work of both environmental and humanitarian NGOs (Bendell, 2006). For example, in 2004, Sri Lankans have protested against corrupt aid distribution while a NGO coordinator in Indonesia was arrested for alleged corruption in relief effort. Similar case exists in PNG where resource or land owners tend to blame NGOs for using their community for self gains and not giving the funds directly to them.

Furthermore, NGOs have been criticized for promoting western aid system with foreign programme goals when the local society has different agenda to promote (Fowler, 2000). The general notion is that, western development framework does not capture local development aspirations and is in conflict, thus, enable the communities to reject and become passive participant in a community project.

Despite these drawbacks, there are more important and crucial elements that attracts government to accept and partner with environmental NGOs to promote environment sustainability work in PNG. The environmental NGO's strengths include: being closer to the rural people and understanding their needs; generally enjoying a great degree of legitimacy in the eyes of the public and being well attuned to public concerns, and to the needs of specific groups that might not be represented by the market or defended by the government (Howlett, n.d; UNEP, 2007; Allard & Martinez, 2008). Their members and representatives have technical expertise in the issue at hand, often due to having worked in difficult settings or with underserved populations.

Table 3-1: Summaries of programme and project goals by NGOs working in Papua New Guinea

Organisation	Operations	Programme goals and objectives	Areas of climate adaptation intervention within PNG
World Wide Fund for Nature	International	Reducing the degradation of the planet's natural environment and building a future in which humans can live in harmony with nature.	Biological conservation planning, establishment and management; and climate change adaptation projects in Western, Madang, Manus and Central Provinces
The Nature Conservancy	International	Accelerating the development and effective management of marine protected areas that are resilient in the face of climate change.	Building capacity for locally based institutions to design a sustainable future for the land and water of high biodiversity priority areas in Madang and Manus Provinces
Wildlife Conservation Society	International	Combating effects of climate change on wildlife and wild places across the globe.	Strengthening capacity for local communities in Manus and the rest of PNG to adapt to climate change.
Partners with Melanesia	National	Conserving biodiversity and building local capacity to respond to environmental change	Promoting biodiversity conservation in Oro Province while assisting with a climate change adaptation project in Watabung, Eastern Highlands Province
Center for Environmental Law & Community Rights	National	Advocate for protection of environmental and human rights	Climate change is part of their advocacy programme and they have since been working with partner NGO, community groups and provincial governments in almost 80 percent of PNG.
Research & Conservation Foundation	National	Conserving biodiversity and the cultural history of Eastern Highlands Province	Assisted with and promoted a climate change adaptation project in the Kompri valley, Eastern Highlands Province.

They also have dense and extensive networks which is different from those of the typical government, and they are often more cost-effective than their private or public partners. Subsequently, they are the interface between citizens, government and multilateral organisations such as United Nation Environment Programme (UNEP, 2007). Moreover, environmental NGOs have been shown to be visible and to carry out successful work in the areas of human rights, health and environmental protection, and in their areas of concern they serve as an early warning mechanism or monitor of official agreements (Allard & Martinez, 2008; http://beta.adb.org/features/ngos-provide-better-health-care-services-papua-new-guinea). Their strengths have led multilateral institutions to direct more funding through them (Bendell, 2006) and for these reasons the government of PNG has opted to work with them.

In PNG for instance, the government has so far established a Memoranda of Agreements or Understandings that give recognition to the work of NGOs as an important partner in promoting climate change adaptation concept. In my personal experience working as NGO staffer (1996-2008), one such example of MOAs were the consent between NGOs and government to have biodiversity survey conducted by NGO, but report to be provided to the government. Similar example includes community engagement and mobilization where NGO are good at so the government allows them to mobilize communities to participate in important national development project. In such stances, their partnership further enhances the adaptation programme and that will entail assisting the impacted population.

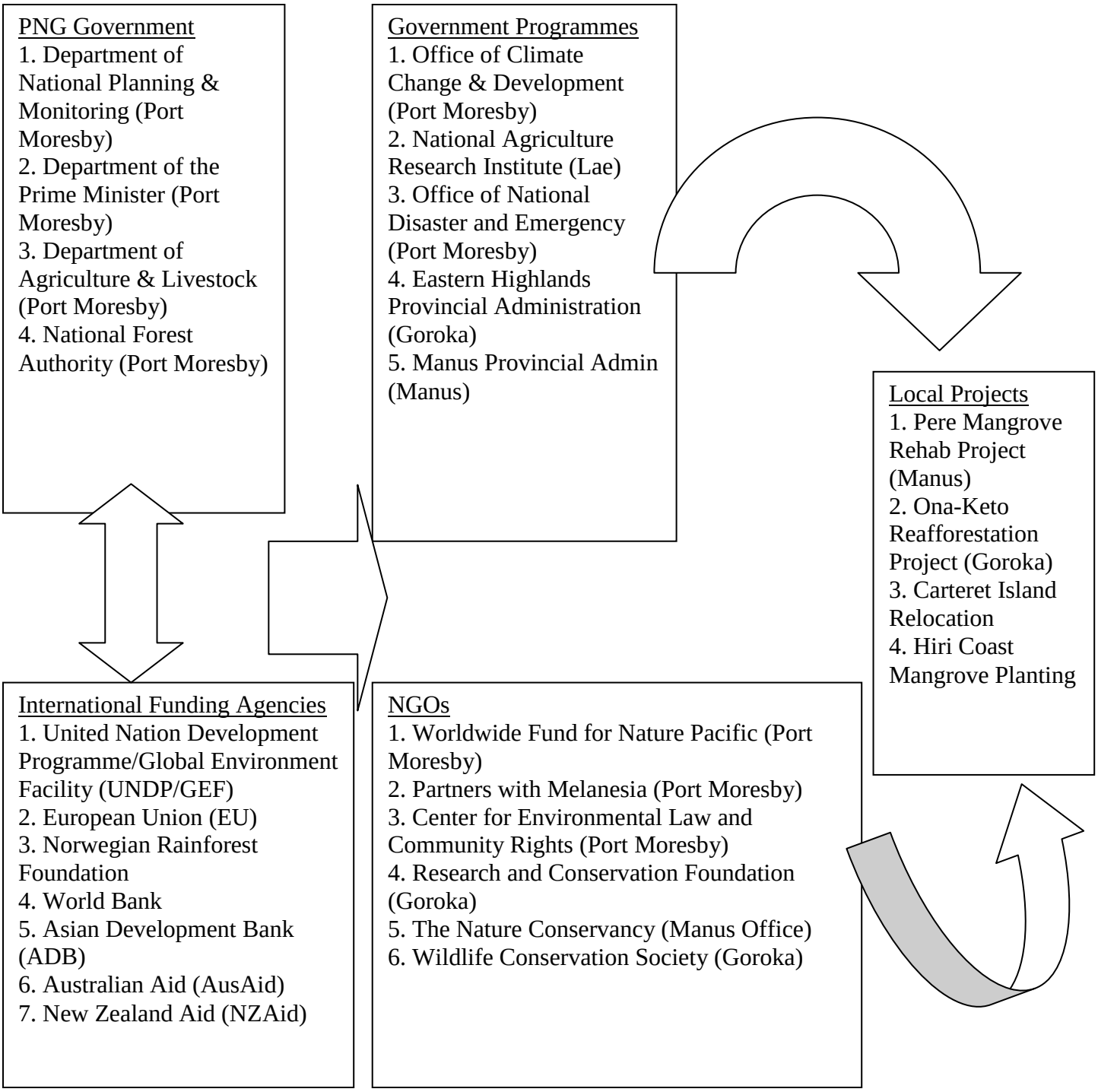

Figure 3-1: The stakeholders with their relationship to the climate change action programme and projects in PNG as indicated with direction of the arrows.

3.5. Chapter summary

Papua New Guinea is proactive in climate change debate and dealings through its association with AOSIS and Coalition for Rainforest Nations. It involves itself in almost all of UNFCCC's organised meetings and plays an important role in promoting the REDD agenda in international discussions. However, because of indifference between the regional power blocs, politically and economically, because those with resources are hardly going to forego them, most of the agreements or declarations are not institutionalized.

Moreover, mitigation is not a priority for PNG since its carbon emissions are small. At the same time the country has a slender national budget for climate change action. As such, PNG can make a difference for itself in the form of protecting its citizens from climate change induced disasters by adopting and promoting adaptation. Adaptation is a viable concept as it is something that PNG can do; and all environmental NGOs are actually on the ground, working with communities, which is a plus for the nation in terms of its climate change response. More importantly, the government's continuing commitment to working closely with NGOs despite the number of weaknesses in their work will continue to help in reaching affected communities widely and build resilient communities. To get an understanding of the current status of adaptation activities that are happening throughout PNG, a process is needed to gather the detailed information so it can sheds light on the subject and chapter 4 highlights the approaches taken to gather information for this study.

Chapter 4: Research Methodology

4.1 Introduction

This chapter describes the investigative technique employed in this study. The study used qualitative methods to gauge the experiences and insights from stakeholders at various levels that were involved in promoting climate change adaptation projects in PNG. The process included the administering of questionnaires on-line, in-depth field interviews, and direct observation; and where necessary, visiting the various webpages, including written documents for comparing the data collected. The information obtained from each participating group included: the knowledge and understanding of climate change; the strategies employed to address the climate change issue; and their views on how to make the impacted communities become aware of and adjust to the changing climate.

The chapter begins with 4.2, Qualitative research. This section elaborates the meanings of qualitative research and explains the relevance of the research methodology employed in this study. Section 4.3 contains a discussion on the qualitative research design of the study. It gives a description of the design based on the objectives of the case studies while portraying the way the data were collected. In addition, Sections 4.4 to 4.6 provide an explanation of the processes or steps that were taken to gather the necessary data for this study. It starts with the designing of the relevant qualitative research questionnaires; sampling and data collection, the procedures followed; and the data analysis. In the data

analysis section, there is an outline of the steps employed to sort out the data in order to make it easy to draw narratives. And finally, Section 4.7 provides a description of the ethical standard required for the research, and Section 4.8 sums up the methodological aspect of this study.

4.2 Qualitative research

Qualitative research in human geography is regarded in a broader sense as concern 'with elucidating human environments and human experiences within a variety of conceptual frameworks' (Winchester & Rofe, 2010:10). However, in a more explicit form, McGuirk and O'Neill (2010:191) state that qualitative research 'seeks to understand the ways people experience events, places, and processes differently as part of a fluid reality, a reality constructed through multiple interpretations and filtered through multiple frames of references and systems of meaning-making'. In comparison to quantitative research - another common form of research methodology - the differences are in the 'contextual frameworks from which they have been derived' (Winchester & Rofe, 2010:23). Thus, quantitative research is based on the assumption that the world is 'made up of observable, measurable facts', whilst qualitative research 'begins with assumptions; a world view, the possibility of theoretical lens and the study of a research problem inquiring into the meaning individuals or groups that ascribe to a social or human problem' (Cresswell, 2007:37). Rather than trying to measure and quantify aspects of a singular social reality, qualitative research draws on methods aimed at drawing out and interpreting the

complexities, context, and significance of peoples' understanding of their lives (McGuirk & O'Neill, 2010:191).

Furthermore, it is becoming a norm that 'qualitative research in geography is now used to address a huge range of issues, events, and places and that these studies utilize a variety of methods' (Winchester & Rofe, 2010:8). Hence, as Crang (2005b:225) suggests, there is a rigorous and well-laid epistemological foundation about qualitative methods in geography and it can be used widely but with caution as it comes with 'a certain conventionality of approaches'; and Winchester and Rofe (2010:8) further add that the weight of qualitative analysis rests on a limited range of conventional techniques. In reflecting this view, Davies and Dweyer (2007) assert that interviews, textual analysis, and associated observationally based ethnographies embody a suite of methods that remains the backbone of qualitative research in human geography' (Winchester & Rofe, 2010:8). From this standpoint, the employment of qualitative techniques in this study was firmly grounded on the concept of ontology and epistemology, so the insights gathered would highlight the day to day experiences of the vulnerable communities.

Hence, it was proper to use qualitative methods in the case studies as the main approach to field data collection in order to produce rich information for this study. Although the quantitative approach is employed through questionnaires, it could only provide a fraction of the overall data needed for the study. The general notion is that the qualitative approach will enable the collection of a variety of empirical data through case study

observations, on-line administration of responses to questionnaires and in-depth interviews.

Nevertheless, in employing the qualitative methods in this research, several considerations needed to be taken into account before accepting the general qualitative research paradigm. That is, one has to bear in mind that 'qualitative researchers use an emerging qualitative approach of inquiry, the collection of data is in a natural setting sensitive to people and places under study and the data analysis is inductive and establishes patterns or themes' (Cresswell, 2007:37). This is because the employment of qualitative research in this study basically stemmed from the issues of climate change adaptation projects in PNG. The implementation aspect of the adaptation projects needed to be evaluated to provide insights into the feasibility and viability of strategies that are put in place. Thence, drawing descriptive examples from Bradshaw and Stratford (2010), the following basic characteristics generally connected with qualitative inquiry were adopted for this study: naturalistic inquiry, inductive analysis, holistic perspective, qualitative data, personal contact and insight, unique case orientation, context sensitivity, empathetic neutrality and design flexibility.

4.3 Qualitative research design: Case Studies

The main objective of this study is to ascertain if the implementation of the current climate adaptation projects is helping or working against the government sanctioned national climate change activities in Papua New Guinea. In order to meet this objective,

the research sought information on the experiences of individuals and the meaning of events and places through the employment of four main types of qualitative research that are employed in 'human geography, such as oral (primary interview-based), textual (documentary, creative and landscape), observational' and questionnaires (Winchester & Rofe, 2010:8). In every aspect research was designed based on the issues that were experienced or present. Hence, the method, the indication of form, quantity, and scope of the study were obtained from the main research question related to the topic and objective of the research. The design also evolved over time based on the data collected or available throughout the process. Although I am from PNG and had previous experience in working with rural communities as well as an understanding of the system of governance from the central to the local level, the topic of this research was new. Thus, I have had to read existing literature on qualitative research and take into account some of the emerging issues in qualitative research in human geography before contemplating the research itself.

Furthermore, the original research questions were used as a guide with the knowledge that adjustments would be made when conducting interviews in the field with the participants. These include other methods employed in data gathering in order to accommodate the cultural norms and other important activities that were present in the community.

4.3.1 Case Study Procedure

There are varying definitions of a case study but a concise definition given by Gerring as quoted by Baxter (2010:81) is 'an intensive study of a single unit for the purpose of understanding a larger class of (similar) units'. It is further elaborated by Gregory and others that a case study 'epitomizes a process or complex set of processes in context, thereby demonstrating how theoretical tools can be applied to the social world' (Gregory, Johnston, Pratt, Watts, & Whatmore, 2009:91). However, Baxter (2010:81) warns that care must be taken not to blend 'sample size' with the 'quality of the case study research'. In this case, consideration must also be given to multi-case studies associated with temporal and spatial comparison. Thus, as Baxter (2010:81) recommends, case study research can also be defined as 'the study of a single instance or a smaller number of instances of a phenomenon in order to explore in-depth nuances of the phenomenon and the contextual influences on and explanations of that phenomenon'. Since this study seeks to understand the local communities' attitudes towards climate change and the adaptation concept, the case study concept was adopted. That is, the concept would help me to better understand the issues that are dealt with by the local people in implementing climate change adaptation projects.

Moreover, the two case study sites were selected, bearing in mind the importance of the local community's perception and engagement in climate change actions. The following sections detail the study procedure by examining research questions; the level and units

of analysis; selection of case studies; field contact; the use of interview language and the research challenges.

4.3.2 Formulation of the research questionnaire

In the process of formulating the research questions, I acknowledge that similar researches have been conducted by 'fellow geographers and other colleagues' before me (Bradshaw & Stratford, 2010:70). They set the scene that involves established disciplines with relatively defined and stable areas of interest, theory, and research methods and techniques. Therefore as member of the interpretive community, the choice of the research topic and my approach to conducting the study were very much influenced by past research experiences (Bradshaw & Stratford, 2010). Moreover, the aim of the research has shaped the way the research was designed and the questions asked. That is, the decision to go ahead with a questionnaire was based on careful reflection on detailed research objectives, consideration of existing and alternative information sources, and appropriate ethical contemplation attuned to the Pere and OnaKeto communities' cultural context for this research (McGuirk & O'Neill, 2010). The following paragraphs highlight the necessary considerations given in formulating generic questions for case study interviews and the online administered questionnaires.

The sources of raw data are from four different groups that were directly involved in climate adaptation projects in PNG. These groups include international funding agencies, PNG Government Departments and Programme Offices/Research Institutions, NGOs and

the local communities. The type of information needed was clustered into three main objectives, based on the research topic. Under each objective, there were sets of questions formulated that directly correspond to the objectives.

The first objective looks at gaining insight into the climate change knowledge and issues of each group. The second objective looks at the strategies each group had to address climate change vulnerability; while the third and final objective attempts to get expert opinion on what they understood to be the best approach to addressing climate change challenges and how that could promote sustainable livelihoods. The research and field data gathering question was then arranged into two sets. The first set was targeted at key respondents that could not be reached for face-to-face interviews. They were then sent the questionnaire with specific instructions and guides to follow through emails. The second set was for those who would be interviewed face-to-face and the researcher took the structured questionnaires to the field, asking the participants and noting the responses for transcriptions.

4.3.3 Contact and field engagement

Apart from administering questionnaires online, an equally important component of the research data collection was getting out to the sites where the phenomena to be studied were located. Inevitably this required me to travel to PNG, specifically to Port Moresby (the capital) where most of the government departments and the programme offices, including a number of NGOs, were located, and to Manus and Eastern Highlands

Provinces where the village communities (project sites) were situated. Before going out for data collection I had to send occasional emails during the preliminary stage (proposal writing and secondary data collection). I also sent emails before the actual date of going to the field to visit NGOs (TNC and PwM) that worked directly with Pere and OnaKeto projects. As Dunn states, this was specifically carried out to ensure the information on my visit was passed on to the participants. Moreover, a relationship would have to be established between myself and the participants as this was 'critical to the collection of opinions and insights' (Dunn, 2010:113) At the same time getting some background information from the NGOs to acquaint myself with the local situation was negotiated.

Once the communication link was established with the granting of permission to conduct field work, as is usually required in ethnographic research (Dunn, 2010:112), the actual field work took place from the 3rd of July to 14th of August 2011. This period was spent in Port Moresby, Lorengau (capital of Manus province), Pere, Goroka and Watabung (OnaKeto villages) to gather empirical data from the case study sites, the government and NGO offices. Roughly two weeks each were spent in Manus, Goroka and Port Moresby. In Port Moresby, the time was spent in interviewing government and NGO officers, and review logistic for further field work.

The following sections provide an overview on establishing field contacts, organizing of field work, and subsequently the gathering of data with the main participants.

Knowing the participants (stakeholders in climate change)

Since the interest in this research was established from my previous working experiences as stated in Section 1.7, I had a fair idea of whom the key participants were. The key participants in this regard were those with relevant in-depth knowledge and experiences on the subject under study, where the information was not found in published form (Bradburn, Sudman, & Wansink, 2004). The organizations and agencies' websites were also visited using "Google search" to establish whether they were currently engaged in the climate change programme.

As soon as their programme activities were verified, the contact details were obtained and emails sent to introduce myself as a researcher and my interest in the subject under study. This was a continual process as follow up emails were sent while the research proposal was put together. Many replied and gave the contact details to persons that were responsible for dealing with climate change issues. In a subsequent email, further introductions were made to the officers letting them know that I would contact them in the near future for my research. Thence this process enabled me to liaise, access information, identify the case study sites for the field research and administer questionnaires online.

The facilitating agencies (TNC & PwM)

The subheading; "facilitating agencies" in this instance is used to denote the involvement and the relationship the two NGOs have with the case study sites in which field data were gathered. The two NGOs are basically involved in a facilitating role where they provide information through the distribution of educational materials or oral communication. At times they organize training workshops to build the capacity for locals to expand or succeed in their initiatives.

Nevertheless TNC and PwM responded favourably to my request for identification of a project site in PNG that dealt with climate change adaptation. The project managers in the organisations agreed that they were working in partnership with communities that were directly involved in climate change adaptation projects; and would assist in facilitating my research with the communities. Eventually a number of emails were exchanged between the project managers to establish communication links with the communities and also to provide me with information on the logistic part of the trip to, and my stay in, the villages. Further to that, I had to spend a day or two in their offices while in PNG to verify, confirm and finalise my travel by making telephone calls to the community project chairpersons. I also used this opportunity to observe their work and engage with other staff members and their partners. The opportunity provided valuable insights into TNC and PwM operations and meeting with staff that were directly involved in the projects. Participant and direct observations were also used in this instance to gather information.

After completing my field researches, I made a brief presentation to the NGO project managers of my preliminary findings. This was also used as an opportunity to further verify the issues identified and provide additional sources of information for the research.

Pere Alalau Association and OnaKeto People's Foundation (project implementation and management unit)

Establishing a relationship with my key informant was a critical part of my research. Fortunately TNC and PwM facilitated the important role in linking me to the Pere and OnaKeto people. The community leaders and members understood the importance of my research and wrote me a "letter of acceptance into the community to conduct my interviews" (appendix 4-1: a & b).

When I finally arrived in these communities I was warmly received by the leaders and members of the community. My introduction explained the purpose of my visit, the importance of my study and their role in my research (appendix 4-2). They replied overwhelmingly that they were expecting me and had no hesitation in participating in my study. I was introduced to my guides and my home-stay host. Furthermore, the key participants were identified by the Ward Councilor and the Community Project Coordinator respectively. In effect, such organization by the communities made my research simpler and I managed to gather insights from all stakeholders of the projects identified as key participants. The key participants were: Ward members, the Project

Steering Committee, Women, Church and Youth groups, the Village Reforestation Committee, Board Members and the other interested members of the community as observers.

4.3.4 Selection of case study sites

The participants in this research as indicated in Figure 3-1 have had direct interventions in PNG's climate change programme. Of these four main groups that were identified, the local project group became the most important participants in this study. They were chosen purposely because they are the ones that show-case the implementation component of the climate adaptation programme.

To select a site for researching was an enormous task. This was so because the projects were initiated by local communities and they were scattered all over the country. Almost all of the projects were in isolated locations. However, despite the isolation, I manage to identify and select two case study sites. The selection of two case study sites was an important consideration, the NGOs' project coordinators indicated their willingness to support my research by liaising with the communities and the provincial government. They have been working directly with the communities and have their field offices established within the provinces or project sites. Hence communication with the communities was easy, and that enabled my access to them by passing the information to and fro on a timely basis.

There could have been other sites but given the time constraints these two were given priority. And the priorities were set based on my judgment as a researcher and guided by the three abovementioned criteria with approval from my supervisors. My judgment was that the two sites would provide the necessary feedback that would directly correspond to my set of structured questionnaires. Furthermore, they were selected to be representative of the climate change adaptation challenges and opportunities that are encountered throughout PNG (see similar experiences as presented by McGuirk and O'Neill 2010:205).

4.3.5 Field engagement in a multilingual context

As stated in Section 3.2.2, PNG is a multilingual society and unfortunately I could not speak either of the Titan (Pere) and Siane (Watabung) languages. On the contrary, the communities do not often speak English at the village level. Thus that situation forced me to communicate exclusively in Tok Pisin or Neomelanesian Pidgin English during my entire field work while on the case study sites. Tok Pisin was the communicating language because all of us could speak the language fluently. I tried my best to translate my questions into Tok Pisin for the participants and all responses were in Tok Pisin. However, all the quotes from interviews included in the thesis are translated into English, but pauses and breaks have been omitted, sentences have been combined, and other minor changes made in order to make the quotes easier to read. As Tammisto (2008:10) notes, 'Tok Pisin is at times an ambiguous language, because it has relatively few words, and a single word may stand for a variety concepts'. As a speaker of the Tok Pisin

language, I have tried my best to keep the translated notes in their original meanings as much as possible.

4.4 Target groups and data collection

The target groups and the type of responses, including the responding organization or the agency's name and the number of responses are indicated in Table 4-1. The participating groups are represented by the programme managers, project coordinators; and the chairpersons of the projects, project steering committee, women, youth groups, village reforestation committee and LLG members who had been involved directly in the climate change adaptation issue.

In gathering the much needed data to address the main research questions, various qualitative data collection methods were used. These included specific methods commonly employed in human geography to gather qualitative data such as: direct observations, in-depth interviews (semi-structured and unstructured), and online administration of structured questionnaires (McGuirk & O'Neill, 2010; Dunn, 2010; Kearns, 2010). For the case study, data were gathered through the in-depth interviews, and direct observations. The necessary information was gathered through these approaches.

Table 4-1. Summary of responses from the target data collection sources in this study.

Target group	Respondents	Questionnaire	Interviews	Response (Y/N)	Total responses /group
*State institutions	OCCD	√	√	Y	
	DNPM	√		Y	
	DAL	√		N	2
	NARI	√		N	
*NGOs	PwM		√	Y	
	TNC	√	√	Y	
	WWF	√		Y	
	CELCOR	√		Y	6
	WCS	√		Y	
	RCF	√		Y	
	PNGEFF	√		N	
*Funding agencies	AusAid	√		Y	
	NZAid	√		N	
	World Bank	√		N	1
	ABD	√		N	
	European Union	√		N	
*Case studies	Pere		√	Y	
(community projects)	OnaKeto		√	Y	2

However, not every participant for the online questionnaire responded as indicated on the last column of the table. Some of these participants indicated through email communications to response if they had time because the responsible officers were on duty travel or had some very busy work schedule. Others have not replied to my email or telephone calls. My guess was that, they only decline or not interested to participate.

4.5 Data collection procedure

This section outlines the use of qualitative methods employed in the data collection. From the outset, the data was collected in two parts. The first part included the collection of secondary data and the second part included the collection of primary data. Secondary data largely came firstly from the climate change project and programme planning documents for PNG as well as the reports that were related to Pere and OnaKeto adaptation projects and secondly from the Government profiles and reports on the area (Census, ward profiles). Thirdly, information regarding the organizational profiles and planning documents of PwM, TNC, OCCD, DNPM, funding agencies, as well as climate change adaptation literature for the Pacific Islands region were collected, along with, fourthly, information from other government and NGO groups that have played a role in climate change projects in PNG. Finally, publications and reports referred to me by stakeholders on the area and the projects were used. During the review of the documents, some insights were gained and that helped in fieldwork preparations as well as reviewing the guiding questions for each stakeholder group (see Kini, 2010 for a similar approach). Furthermore, a review was carried out during the analysis stage to help verify the

information or make comparisons between written documents, the experiences and explanations given during interviews and the observations made in the field (Dunn, 2010).

The primary data was collected during the field work and through questionnaires that were administered online. For the online administered questionnaires, email communications and responses from individual participating groups took a period of almost three months. Field work, on the other hand, took roughly two months. The field data collection method focused on the employment of open-ended questions. This approach enabled me to understand the reality of the work in which the participants were involved, and to gain insight into, and understanding of their perceptions, experiences, actions and attitudes towards climate change adaptation in the communities and across PNG (Dunn, 2010; Kini, 2010). Nevertheless, the following sections describe the main methods employed during the primary data gathering expedition.

4.5.1 Key Informants

In qualitative data gathering, key informants are important to the research. They provide information that is not available in published form or they have relevant in-depth knowledge of the issue. Conversely they may have limited knowledge of the subject under study, thus information provided may be distorted by their attitudes or roles in the community (Bradburn, et al., 2004). After consideration of Bradburn's comment, care was taken in the process of identifying the key informants. Hence, the key informants

were selected based on their roles in the adaptation projects as well as the major roles they play; and these provided sites for exploration within their respective groups and in other groups. Moreover, more than one informant was used in order to provide cross-checks between informants in the different groups to validate issues that were emerging within the group or across the groups (Kini, 2010).

4.5.2 Interviews

There are three major forms of interviewing technique employed in human geographical researches: 'structured, unstructured and semi-structured' (Dunn, 2010:102) and this research employed all three methods during the field data gathering session. The sample of the interview outline is presented in appendix 4-3. This was necessary as the information needed would be gathered through interviews. The structured interview method was employed because the interview questions were predetermined and questions asked were standardized. The questions were subsequently asked in almost the same order in each interview. During the interviews, opportunities arose for the employment of semi-structured interviews (using structured questions as a guide). Probing questions were asked subsequently; while flexibility was allowed in the way issues were addressed by the participants. Unstructured interviews were mostly employed during casual communications with the field participants where the conversations were directed by the informants.

Structured and semi-structured interviews were conducted with participants in formally arranged meetings and took three hours at the most. Many of the interviews were conducted in groups, as in the village circumstances group discussion was necessary to allow different age groups, classes and sexes a fair sharing of information and experiences. As the facilitator, I managed to ensure that different persons in the group had the opportunity to speak by asking subsidiary questions directed at the person who had not seemed to speak in more than one or two conversations. As a consequence, the amount of discussion and sharing of information allowed me to understand how meanings differ among people.

During the interviews, a digital voice recorder was used to record conversations as part of the note taking. Both of these note taking techniques were employed because first, it would help in triangulating the information gathered and, second, it would help to capture as much valuable information as necessary. During the evenings, or at the end of every interview, reflective notes were written to save time for future transcribing tasks and also to ensure correct messages were written when the information was fresh in my mind.

4.5.3 Administration of the questionnaire

The questionnaire is another important form of gathering ‘original data about people, their behaviour, experiences, and social interactions, attitudes and opinions, and awareness of events’; and is commonly employed in human geography as it poses ‘standardized, formally structured questions to a group of individuals, often presumed to

be a sample of a broader population' (McGuirk & O'Neill, 2010:191-192). In this study the questionnaire was employed to gather information from participants who could not be reached for a face-to-face interview. Sample of the questionnaire is presented in appendix 4-4. The summary of the target groups and their responses are presented in Table 4-1. Out of all the participants, only seven replied and provided the necessary feedback. Others did acknowledge my email but did not provide any feedback.

The questionnaire contained three types of questions: open, closed, and a combination of both. The open questions were employed to 'understand how meaning is attached to process and practice'. In this instance, respondents were allowed to interpret, add qualifications and justifications to their own understandings. Closed questions are those questions formulated to 'seek quantitative information about respondent attributes', for example, rating their groups' success in adaptation activities. The combination questions, on the other hand 'request some elaboration on or explanation of the selection made in a closed question' (McGuirk & O'Neill, 2010:194-195). These questions were then emailed to participants with follow up emails on a fortnightly basis to ensure feedback was received. Unlike the face-to-face interviews, this process took almost three months as the responses were very much dependent on the researcher keeping track of and reminding the participants.

4.5.4 Direct observations and story telling

The definition of observation by Crang (2005) and Kearns (2010) is about an active choice of what to see and how to see a phenomenon as it occurs. In the case of social scientific research, observation is carried out for the following reasons: 'counting, complementing and contextualizing' (Kearns, 2010:242). As Kearns (2010) further states, counting refers to an enumerative function for observation, whilst complementary, the rationale here is to gather additional descriptive information before, during and after other more structured forms of data collection. And contextualizing, on the contrary, is to construct an in-depth interpretation of a particular time and place through direct experience.

Nevertheless, this direct observation approach is about gathering additional descriptive information (complementing the interview notes) while staying on the case study sites or visiting TNC and PwM's offices. This means that, as a researcher, I was not involved in any activity, but observed what was actually happening on the ground, including observing the kind of adaptation activities that were carried out, witnessing the effects of rising sea levels, listening to the ordinary conversations of other villagers or staff and watching community groups organizing themselves to plan and implement activities.

Apart from observing phenomena directly, another form of data gathering referred to as 'uncontrolled observation' or story telling was used in this study as well (Kearns, 2010:243). In social scientific research, there is more to just seeing: there is also listening

which is a critical aspect of several approaches to human geography (Kearns, 2010). Moreover, 'effective listening can assist visual observation by both confirming the researcher as a participant and by attuning oneself to soundscapes and the aural aspects of social settings' (Kearns, 2010:243). As a researcher, I then also used the opportunity to share with or tell stories to any interested persons in the villages and to the staff of the two organizations to get background information about the adaptation projects, as well as their experiences of the activities that were happening to date.

During observations and storytelling, mental and written notes were made, as well as taking photographs, to give a record of my daily experiences, including my attitudes towards these things. Subsequent recordings were written in my field notebook.

4.6 Data Analysis

In order to analyse field data inductively as is commonly practised in qualitative research (Cresswell, 2007), the sources of information were divided into three main categories: the case study, the questionnaire, and the observation. These categories were established to facilitate the construction of 'themes, relations between variables, and patterns in the data through content analysis' (Dunn, 2010:125). Such an approach was important as the identification of patterns among the data and their relationship to the theoretical understanding of the study should essentially reflect the actual viewpoints of the participants. Eventually, the information was separated under the three main categories

into codes, which were then clustered into concepts and finally into more general classification themes

The coding system for the interviews, observations and the questionnaire was based on the knowledge and understanding of climate change (meanings and perception of climate change in general) by the participants; the strategies or plans the implementing agencies have for adaptation, and the possible suggestions (successful adaptation from within and elsewhere in the region) to ensure vulnerable communities become more responsive to the climate change.

However, the questionnaire on the other hand employed a mixed-method approach that blends qualitative and quantitative data. For qualitative data the sorting was similar to that as explained in the preceding paragraph; but for the quantitative data (based on closed questions), they were coded 'numerically and analyzed for patterns of response and relationships between the variables that the questions have interrogated' (McGuirk & O'Neill, 2010:213). The identified patterns and relationships between variables were then placed under the codes established in the qualitatively analyzed data group as an additional numerical value for the insights into the subject under study. All in all, at each stage of the analysis, I as a researcher was mindful of engaging in critical reflexivity, especially when considering how my own frame of reference and personal position shaped the ways in which I proceeded with the analysis (McGuirk & O'Neill, 2010). Furthermore, not every text has been coded (Dunn, 2010) when qualitative data analysis need not to be reducible to a neat set of techniques (McGuirk & O'Neill, 2010). Hence

the analysis of the qualitative and quantitative data in this research was customized under each question so the quality of the insights were retained and presented in a summary form at the findings sections.

4.7 Research challenges and human ethical considerations

The challenges encountered from planning to actual field work were logistics and establishing communication with possible participants. As it was a multiple case study with many organizations, institutions and agencies having a stake in climate change issues in PNG, I had to make sure of obtaining the correct contact details and the key persons to provide me with the insights into their work or the subject under study. While the planning was carried out in New Zealand, I tried to google or contact friends in PNG for the contact details of participants. I managed to get all of the contact details, but when sending emails, the responses were minimal. This was despite the fact that I communicated on a fortnightly basis for at least three months (June to August). Logistic problems, on the other hand, related to cancellation or delay of scheduled flights with PNG's national airliner, Air Niugini. Luckily these interruptions to my scheduled travels did not affect my time to conduct the field work.

As for the human ethical aspect, approval was given by the University of Canterbury's Human Ethical Committee before I departed for my fieldwork and sending out questionnaire via emails to the participants (appendix 4-5). In the questionnaire, an information sheet was provided regarding the subject under study, my interest as a

researcher and what the respondent was expected to do (appendix 4-6). At the same time, a consent form was included with the information letter to seek their consent to participate (appendix 4-7). Such information clarified my position and the purpose of my research. In effect the information enabled the participants to provide responses with ease.

The case studies conversely required approval from the project managers to conduct my fieldwork in the villages where the projects were situated. Since I was not a local person, the invitation would have also indicated that I could reside in the villages and talk to the people. As soon as approval was given in the form of a written letter and emailed to me, the Human Ethics Committee was notified of the same and the field expedition started. While in the villages, introductory meetings were held with everyone to explain the purpose of my visit, spelling out clearly that I was there as a researcher and came at the invitation of the project management team. The villagers were also informed of their participation. During the presentation, time was allocated for comments or queries for clarification. Furthermore, as I engaged with each group in data gathering, consent was sought in the form of written consent, signed by participants, including confidentiality issues such as the use of names and the avoidance of cultural stress or deception, and the safe keeping of interview notes. The participants were constantly reminded of these issues while they participated in the interviews. In the end the interviews went smoothly and much needed information was collected during the six weeks of field work.

4. 8 Chapter summary

This chapter has outlined two important aspects of the research. First, it attempted to provide an overview of the main philosophy, theoretical perspectives, methodologies and strategy and research procedure that were taken into account in designing this research. It emphasized that this research is a qualitative research and the models employed are related to human geography. In essence, the case study strategy was used to get close to the location where an event or an activity was occurring to explore the way climate change affects the wellbeing of the local communities, or their responses to changing climate. The strategy enabled the accessing of deep and rich information that generated insights which are useful to this case study.

Second, the chapter described and explained in detail the considerations and manner in which the data collecting and analyzing were carried out to provide answers to the research questions. A number of ways of data collection and analysis procedures were employed in this study to investigate the perception and the manner in which climate change adaptation activities have been dealt with by concerned stakeholders. The chapter also addressed the way data reduction; presentation and organization were carried out. It ended by highlighting the challenges and human ethical considerations of the research. The findings from the methodology employed in this study are presented in chapters 5, 6 and 7.

Chapter 5: Understanding climate change knowledge

5.1 Introduction

This chapter begins the research findings on the questions surrounding the understanding and knowledge of climate change and the associated issues, in particular the communities and partners that are engaged in implementing policies and projects. The main purpose of this chapter is to highlight critical issues pertaining to the understanding of background information on the adaptation concept. The findings on the conceptual aspect of knowledge of climate change in a wider perspective are based on my field interactions with the communities of Pere and OnaKeto and the responses from the stakeholders who were contacted through questionnaires, which were administered online. Section 5.2 discusses the implementers' understanding or their knowledge of the climate change issues; whilst section 5.3 discusses the general understanding of the various impacts climate change have on rural livelihoods. Section 5.4 subsequently adds to the local experiences of climate change induced vulnerability; and section 5.5 explores the collaborative opportunity that the project implementation team assumed was essential to the project's successful progress. Finally, section 5.6 summarises the chapter with the highlights of the findings on the knowledge and understanding of the adaptation concept.

5.2. Rural communities' understanding/description of climate change

The approaches taken by the local communities in Pere and OnaKeto villages, and getting a glimpse of what climate change means to them and how they came to give a descriptive meaning to it, are central in this study. The same notion applies to the national climate action groups, such as state institutions, NGOs, donor agencies and research institutions' perceptions on climate change. Knowing what climate change is generally and then relating it to the local situation would place the vulnerable communities in a better position to address it systematically. Such an approach is regarded as important because in Papua New Guinea, as Mercer (2010:255) states, the climate change terminology itself is foreign to the local communities. The problem is also commonly experienced across the Pacific; for instance, the Druadrua community of Fiji indicated they were not familiar with the concept of climate change (Dumura, 2010). Rather, communities are concerned with interrelated processes such as political, social, environmental and economic factors impacting their community and the people of Pere and OnaKeto have shared a similar view.

As can be seen in Table 5-1, they gave an overview of what they understood climate change to be, and as it is within their own local context. The technical terms that are used to explain climate change by the scientific community may however sound confusing to them. By contrast, they understand the changes in the climatic cycle by basing them primarily on their own local experiences.

Table 5-1: The generalized summaries of communities' description of climate change.

Pere Village-Manus Province	OnaKeto villages-Eastern Highlands Province
*We do not understand the technical meaning of climate change but have observed and experienced changes in north and south westerly wind directions, rising sea levels compared to the past and a continuous dry season for a longer period of time.	*We only know our cosmology but the experiences we go through in our daily lives, such as a prolonged dry season, heavy rainfall with flooding and landslides not experienced in the past years, are something new and we do not know what causes the changes.

The local or indigenous knowledge about cosmology and climate change is however vital as it helps vulnerable communities to understand the changes that are happening, which have either direct or indirect impacts on their livelihood (Macchi, et al., 2008). For instance, Lefale (2010:323) alludes to the Samoan situation where extensive knowledge of cosmology has led them to predict environmental changes, including changes in the climate and weather. On the contrary to indigenous knowledge on climatology, as my personal observation shows, there is a need for the local communities to have a broader knowledge and understanding of key meteorological features such as the El Nino Southern Oscillation (ENSO), the South Pacific Convergence Zone (SPCZ), the Interdecadal Pacific Oscillation (IPO), and the Inter Tropical Convergence Zone (ITCZ) that drive the climate and weather of the tropical western Pacific region (Lefale, 2010). Hay et al., (2003: chapter 2), Mimura et al., (2007:690-695), Lefale (2010:320-323) and

World Bank (2010:3-4) provide detailed characteristics of meteorological features that affect weather patterns of the Pacific Island countries including PNG. Nevertheless, once the local communities understand these dynamic meteorological systems, their knowledge can allow them to analyse and understand the reasons for their vulnerability (Mercer, 2010:255).

The translation of the technical scientific terminologies or complex concepts into simple language for local communities' to improve their understanding can be carried out by those Papua New Guineans who are highly educated and working in an environment that is related to ecological and climate science. When this study consulted the organizations and institutions in adaptation practice of knowing the technical terms and could provide information to the communities, the responses varied and are illustrated in Figure 5-1. Out of the seven respondents, 72 percent indicated being "quite knowledgeable" about climate change issues, particularly at the national level. In this case, the national level comprised NGOs and government departments or programmes in PNG that have climate change adaptation programmes. However, at each extreme, a funding agency indicated that it does not understand the climate change issues very well, while an NGO indicated being well versed in the issue.

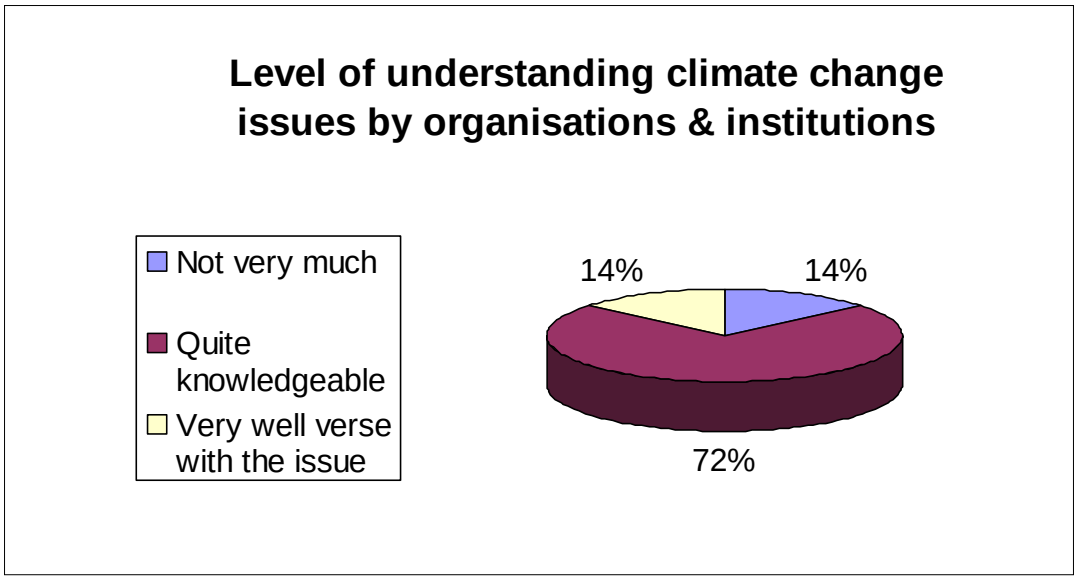

Figure 5-1. The pie graph shows the level of understanding and knowledge of the climate change issues by government departments, programme offices, donor agencies and NGOs working on climate change adaptation projects in Papua New Guinea.

The NGO that is well versed in the climate change issue has programmes that are in the advanced stage of implementation elsewhere, and that experience can be applied to the PNG case project. For instance, this particular NGO (Wildlife Conservation Society) was in the process of mobilizing communities in Manus to plan and implement a climate change adaptation project. This organization's experiences will fill in the knowledge gap in successful adaptation when the situation allows it. Conversely, the donor agency (AusAid) with limited knowledge of climate change means to imply that it has least knowledge of climate change issues. It does however have basic understanding of the issues and supports institutions and organizations that deal directly with the implementation aspect. Nevertheless, despite the variations in the climate change knowledge and understanding of associated issues, the general notion is that people of

Papua New Guinea are aware of the issues and knows that climate change is happening (Mercer, 2010:260).

With regard to the current knowledge gap, the issues that Papua New Guineans are dealing with in light of climate variability and environmental changes include: crop diversification; changes in village settlements; alteration to hunting and gathering practices; decline in plant and animal varieties or species, and changes in food storage methods and food habits, including forests as a source of food and new material. The details of these coping strategies as a process to building resiliency are discussed in Chapter 6. Section 5.3 provides the background to this by discussing the discourse on the understanding and knowledge of interpreting technical scientific terminologies by the vulnerable, and the affected communities.

5.3. Climate change impacts on livelihoods: knowing the information source

Livelihood is about a means of making a living (IFRC, n.d; Moore, 1996). As the International Federation of Red Cross (IFRC) states, livelihood 'encompasses people's capabilities, assets, income and activities required to secure the necessities of life' (http://www.ifrc.org/en/what-we-do/disaster-management/from-crisis-to-recovery/what-is-a-livelihood/); and knowing how climate change affects their way of life is important. The rising sea level for instance, is an issue that low lying coastal communities should be aware of as it destroys freshwater. This is because freshwater reserves are limited to a shallow subsurface lens which is susceptible to contamination from salt water (Barnett,

2001). The IPCC describes climate change as having more direct impacts on the livelihoods of developing countries (Mertz, et al., 2009). These include, for example, changes in agricultural potential caused by rainfall change or inundation of cities and infrastructure due to sea level rise and a higher disease burden. Thus, it is therefore important that rural communities in PNG have access to or know where they can get access to the information on climate change and how it can affect their livelihood. The intent of this section is to highlight, given the limited accessibility to modern technologies such as the internet in rural communities, the identification of where they can get information on climate change which could help in making decisions to strengthen the network. At the same time, it will enable an understanding of the way the communities make decisions in response to the actual or perceived impacts of climate change.

On the question of how the local communities of Pere and OnaKeto came to know the climate change issues and their impact on their livelihoods, Table 5-2 illustrates that they have access to a number of information sources. First, they hear the stories about climate change from university students. These are mainly the students from their communities who have been studying in one of the universities in PNG and have relayed the message. Secondly, they read it in the daily newspapers and hear it on the radio broadcasts. The information they get from such sources are basically abstracts and do not allow for insights into the climate change with its associated impacts on their livelihood.

Table 5-2: Pere and OnaKeto villagers' sources of climate change information regarding impacts on their livelihoods.

How did you know about the issue of climate change and its impact on your livelihood?	
Pere Village, Manus Province	OnaKeto villages, Eastern Highlands Province
*Heard from university students, read in newspapers and heard on radio broadcasts about climate change and its associated issues. *Through awareness and training conducted by NGOs based in Manus and PNG such as Seaweb International, CELCOR, WWF and TNC. *From local observation of the surrounding environment where rising sea levels led to eroding shorelines, inundation of sago production areas with increase salination, and a prolonged dry season that led to a shortage of fresh water.	*Awareness from NGOs (Partners with Melanesia) and NARI and relate them to local climate variability such as prolonged drought, continuous rainfall, including flooding and landslides. These affected the growing of food crops, caused lack of clean water, dying of food crops intended for local consumption or for selling.

In spite of that, they also receive information disseminated by NGOs. So far NGOs play a pivotal role in awareness raising and information dissemination in rural PNG where often no outside organizations can provide such services. The government of PNG recognizes the very important roles NGOs play in areas of information sharing, building capacity and promote sustainable development initiatives (Unage, 2009; DNPM, 2010a; World Bank, 2010). Therefore, the government institutions such as the National Agricultural

Research Institute (NARI) provide their published information in collaboration with NGOs. NARI mostly responds to requests from the communities through NGOs (Unage, 2009).

The information that NGOs share with the local communities is either from their own research or communications with like-minded organizations. Eventually this information is disseminated to the rural communities. The common issues that they are familiar with and share with communities are displayed in Table 5-3. These issues include: sea level rise, food security, increased incidences of diseases that are related to water and sanitation, and impacts on infrastructure and the environment. Of all the issues identified, food security and increased incidences of diseases were the most common issues participating groups identified. When these issues are communicated to the communities, it subsequently enables them to connect them with their local observations on the environmental changes that are taking place as a result of climate variability. The Pere and OnaKeto villagers have indicated this and it is presented partly in Table 5-1.

It is however, important as well to state that 'many individuals, organizations and communities of practice hold different subsets of these existing data, information and knowledge, and have differential access to which they do not hold' (Taylor, Bharwani, & Ali, 2010:25). As such the amount of information disseminated by NGOs and government agencies to the rural communities varies and is distorted. In other words, it is partly to do with the medium through which information is disseminated or communicated; the motivation to engage with the issue; and the skills and expertise

needed (Adger, et al., 2008; Taylor, et al., 2010). Hence, section 5.4 elaborates further on the climate change issues that are experienced locally in Pere and OnaKeto villages; giving rise to the knowledge of climate change issues known either nationally, regionally or globally.

Table 5-3: Outline of the main issues that threaten wellbeing as understood by NGOs and state institutions that promote climate adaptation projects in PNG

Common issues	Individual groups' perspectives on the issues
*Sea level rise	*CELCOR, WWF, RCF
*Food security (livelihood)	*CELCOR, WWF, RCF, WCS, DNPM, OCCD
*Increased incidences of diseases (water & sanitation)	*CELCOR, WWF, DNPM, WCS
*Impacts on infrastructure and environment	*OCCD, WWF

5.4. Climate change issues experienced locally

This section intends to highlight climate change impacted issues experienced locally and which can be related to the general issues communicated amongst climate action groups nationally, regionally and globally. At these scales, some of the actual and perceived climate change risks and hazards mentioned frequently are: food security, habitat loss and other ecosystem changes; diseases; hunger; deterioration of freshwater resources; coral bleaching; coastal flooding; inland flooding; drought; landslides drought and changes in

agricultural yield (Hay, et al., 2003:27; MA, 2005:17-18; OCCD, 2010:13-14). The NGOs, state institutions and donor agencies have also found similar impacts of climate change (see Table 5-2). Coincidently, the local communities of Pere and OnaKeto have expressed that their experiences are the same. As can be seen in Table 5-4, the common climate change related impacts that they experienced are not the same because of their geographical differences (refer to figure 1-1). However, the occurrence of events coincides with those in the literature of the Millennium Ecosystem Assessment (2005) and of Hay and others (2003) who have written about most events that would affect the small island nations in the Pacific.

For Pere village, the changes in the westerly wind direction during certain times of the year have affected their fishing season where certain species of fish that were usually caught during that period could no longer be. The strong winds had either made it too risky to fish or the species are no longer present in that particular area. For instance, as expressed by the chairman of Pere Alalau Association's Environment and Climate Change Committee: 'our entire lifestyle depends on the sea and changes in wind direction in recent times have affected the number of fish caught for that particular time of the year, thus compared to the past' (Pokakes, July 2011: pers.comm) . The people of Pere do not know what actually causes the change in wind direction and disturbing their seasonal fishing pattern. However, these technical information that are of help to Pere villagers is explained by Lefale (2010) as the changes in wind direction are caused by a regional high pressure system belt that exists within the western Pacific.. And the Office of Climate Change and Development (2010) relates it to the El Nino Southern Oscillation (ENSO). It

is also the impact caused by the expansion and contraction of the west Pacific warm pool, including the trade winds and the movement of the South Pacific Convergence Zone (SPCZ) (World Bank, 2010:3; Lefale, 2010:321). The SPCZ is a sub-tropical meteorological feature that is characterized by a band of low-level convergence, and a zone of high pressure rainfall zone that migrates across the Pacific south of the equator (World Bank, 2010). These phenomenons affect the sea surface temperature, influence wind direction and the fish spawning behaviors, thus, affects the fishing patterns for coastal fishing population.

Table 5-4: General outline of climate change related issues experienced locally.

Pere village	OnaKeto villages
*Changes in normal seasonal wind direction that affect the fishing season; *Drying of fruiting trees such as coconut and betelnut; *Inundation of sago production areas and sacred sites; *Erosion of shorelines from rising sea that seems continuous.	*Prolonged drought in recent months (February to March 2011); *Drying up of food crops; and *Periods of continuous heavy rainfall, flooding and landslides.

Additionally, erosion of the coastal shoreline is another phenomenon that is experienced by the Pere community; and an experience that is common to coastal and low-lying atoll islands (Mimura, et al., 2007). Shoreline erosion is directly induced by sea level rise and coastal flooding. OCCD (2010) emphasizes that it is an already serious and regular phenomenon that has a strong relationship to climate change. The shoreline erosion poses threats to cultural and sacred sites (figure 5-2) for example; a cemetery in Pere village is

already at high tide level and will soon be washed away by the continuous impact of the high tides. Also figure 5-3 indicates that the high tide has led to the erosion of the beach front where village houses are on the verge of being washed away. This is a change that is experienced ten years ago. In spite of these climate related hazards, the villagers have tried their best to build a seawall with bush material to prevent the beach front from further erosion; and planted mangroves to stop the cemetery from being inundated by seawater.

Figure 5-2. A cemetery in Pere village is already at the high-tide zone, threatened by a rising sea level. (source: author, July 2011)

Apart from the shoreline erosion, the rising sea level has also affected coastal food production areas. This is synonymously referred to as reduction of agricultural yield by the OCCD and the World Bank. In the coastal areas, an inundation of saltwater has affected the production of sago and other root crop growing areas. At the same time, saltwater affects freshwater resources that include aquatic habitats, fish production and the water supply for households (MA, 2005). For the Pere community, the freshwater supply is another major problem as they can no longer get any water from the wells while

their only source of supply has maintenance problems. Figure 5-4 gives an illustration of the freshwater supply problem that the Pere community is facing at the moment when their only water pump and the reservoir tank need maintenance (personal observation, July 2011); a financial cost that the community can hardly afford in order to maintain the water supply system. More or equally important, loss of food production (agricultural yield) is experienced by both Pere and OnaKeto villages (Table 5-4). The low agricultural yield is caused by a prolonged dry season associated with the ENSO effect (OCCD, 2010) and which has affected food crop production. The OnaKeto villages for example, have expressed concern that the dry season has destroyed the food crops and that has led to hunger- a phenomenon that the Millennium Ecosystem Assessment predicted some six years back.

Figure 5-3. An example of a seawall built of local materials to prevent shoreline erosion that threatens the Pere village setting (source: author, July 2011).

Furthermore, the communities of OnaKeto have indicated they have experienced periods of heavy and continuous rainfall, thus resulting in the onset of flooding and landslides.

Though the heavy rainfall, inland flooding and landslides have moderate links to climate change, the OCCD (2010) and the World Bank (2010) have identified climate change as the main trigger of these events, apart from ENSO and land-use change. In the following section, a possible opportunity that exists to address the climate change issues collaboratively by climate action groups in PNG is described.

Figure 5-4: Pere Village freshwater supply: the reservoir and the water pump shed as shown were funded by the French Government in 1997 (source: author, July 2011).

5.5. Collaborative opportunity

Understanding and collaborating with other like-minded stakeholders through PNG communities are the main possibilities that exist to address climate change issues effectively. It is common knowledge amongst social scientists and community development workers that collaborative practice is central to the way people work, deliver services and produce innovations (Keast & Mandell, 2009). By definition, collaboration is generally referred to as 'individuals or organizations working together to

address problems and deliver outcomes that are not easily or effectively achieved by working alone' (Keast & Mandell, 2009:1). Keast and Mandell further elaborate collaboration as requiring a high level of trust and extensive dialogue between participants as the parties agree to be involved in a high-risk, high-stakes and volatile environment that can produce results significantly different from those originally intended. The communities of Pere and OnaKeto have realized that they cannot address climate change adaptation initiatives alone. They lack resources both human and financial because there is a limit to the exchange of knowledge and information on climate change and adaptation in many rural communities (World Bank 2010:11).

Given this lack of resources, the communities of Pere and OnaKeto have sought help from or work in collaboration with NGOs, provincial and local level governments, and forest and agricultural research institutes to support their projects. The Pere community has collaborated with NGOs such as the Worldwide Fund for Nature (WWF), the Nature Conservancy (TNC), and the Center for Environmental Law & Community Rights (CELCOR), Seawed International and Manus Provincial government. Such collaborative work is highlighted by the members of the Environment and Climate Change Committee as:

> They (NGOs & state institutions) work closely with us to raise awareness and help in addressing climate change issues by providing support in establishment of community-based organizations and planting of mangroves (ECCC, July 2011: pers.comm).

OnaKeto communities on a similar note have collaborated with Partner with Melanesia (PwM), the PNG Forest Authority, the Forest Research Institute and the National Agricultural Research Institute. As expressed by all the main participants in Ona and Keto villages:

> They (NGOs & state institutions) help us with technical assistance on how to do nursery work, transplant, and so on, as well as extending the outreach programmes into communities (OnaKeto Villagers, August 2011: pers.comm).

The Pere and OnaKeto communities' collaborative engagement with NGOs and state institutions varies based on their mission and capacity to support their specific areas of interest. For instance, within the NGOs, Seaweb International mainly engages in providing awareness of climate change and raises the communities' issues through the main stream media such as newspapers and radio for public and the authorities' attention. TNC and WWF, on the other hand, focus on training and mentoring Pere Alalau Association to operate and manage Pere village's internal affairs. Similarly PwM have trained and mentored OnaKeto People Foundation to run OnaKeto people's social and economical development needs. Moreover, PwM raises funds and identify possible support groups, and arranging for the external groups to support the communities. Simultaneously, CELCOR provides training on legal rights, conflict resolution and management and advocates for community rights through representation in any legal issues that affect the Pere community. The NGOs' collaborative effort with the

community's effort is imperative because they act as key state institutions or stakeholders in support of the rural community's climate change adaptation projects. As a staffer at WWF explains: 'many of our leaders and policy makers are new to the climate adaptation concept, so we need to build their capacity through a collaborative approach before they can incorporate some of our plans into their work-plans and budgets for good outcomes' (Banka, June 2011: pers.comm).

The government and state institutions also play an important role in consolidating the efforts of the rural communities. They have certain technical expertise and annual budget appropriation for support, but in most cases communication has to be linked between the state institutions and the communities for collaborative initiatives; then, the institutions would have to assist. In this case, NARI for example, has expertise in promoting and supporting crop varieties such as drought resistant crops or high yielding crops to many rural PNG groups. Their involvement with OnaKeto has helped in planting African yams that will enable the communities to retain their food source during prolonged dry seasons. PNGFA and FRI on the other hand assist in providing technical expertise in identification of tree species that can grow well in the barren highlands soil and climatic conditions, while at the same time assisting in the nursery and in planting of the seedlings. Though the support is not sufficient to address climate change issues, whatever capacity they can help with does contribute to reducing the community's vulnerability to hazards and natural disasters. Nevertheless, in order to maintain or improve the support between stakeholders for sustainability purposes, a policy analyst at OCCD states:

> Government, communities and NGOs will have to work together on activities and policy development so PNG can adapt well to climate change in the future. There has to be support from all areas, technical, and financial and also capacity building. There must also be proper coordination at all levels (OCCD Policy Analyst, October 2011: pers.comm).

The OOCD staffer is perhaps pointing out the need for improved coordination, which can be discussed further in chapters 6 and 7, the strategies to deal with the issues and the enabling mechanisms that can make people respond to climate change in a positive way.

5.6 Chapter summary

The technical terminology surrounding climate change is foreign to the rural communities in PNG. The communities are rather concerned with interrelated processes such as political, social, environmental and economic factors impacting their communities. The people of Pere and OnaKeto understand the climatic cycle based on their local experiences with greater attachment to cosmology (myths and rituals) but indigenous knowledge no longer has sufficient explanatory power as it is changing. Such indigenous knowledge has helped in understanding the climatic changes that were happening for their self protection. Possibly this situation demands a need for translation of the terminology by those who are highly educated or well versed in the issue such as NGOs, state institutions and the elite (especially students) from the community.

Climate change related issues such as sea level rise, frequent occurrence of drought in PNG have impacted on livelihoods. Thus the need for provision of detailed information on climate related impacts is important. At present, the communities' source of information is from NGOs, reading newspapers and radio programmes, as well as on an ad hoc basis and transferring them to their local experiences. Therefore NGOs play a key role in information dissemination and building the capacity for local communities for collaboration and networking that enable successful adaptation.

The many climate related impacts experienced locally have seen some support from NGOs and state institutions. However, the support is still arranged on ad hoc basis with no significant collaborative support from other stakeholders to ensure rural communities get appropriate support to address climate change adaptation issues accordingly. Furthering these findings, chapter 6 elaborates the strategies that in currently conceived to implement adaptation projects.

6.0 Strategies to deal with climate change

6.1. Introduction

This chapter discusses the strategies that communities, government or state institutions, NGOs and donor agencies have for addressing social and economic vulnerability issues faced by PNG in general and the people of Pere and OnaKeto in particular. The strategy

for adaptation is developed based on the assessment by local communities and the government of PNG on vulnerability and the climate risks faced both at present and in the future. And the motivation to develop an adaptation strategy can be for many reasons: it may be about protection of the economy or enhancement of public safety in the face of weather-related impacts (Swart, et al., 2009). In this chapter, as it appears from the field data collected, both the project implementers and the programme developers, including the donor agencies, have considered a range of socioeconomic and environmental sustainability factors when developing their strategies. However, there is an interesting contrast between the project implementers and the support agencies (government and financial institutions) in that one looks at addressing issues that face them immediately, whilst the other focuses on policy development, research, and facilitation approaches.

In the following sections, the discussions revolve around current implementation plans (section 6.2), the length of time each participating group is involved in the adaptation activity (section 6.3), and the identification of important things that can make vulnerable communities realize, acknowledge and participate in the adaptation programmes (section 6.4). Further to that, section 6.5 discusses the institutional capacity, each participating group, especially the communities, government and NGOs, has to ensure successful and sustainable adaptation strategies are devised and implemented. Following on from section 6.5, section 6.6 elaborates the views of the practitioners and the appropriate adaptation activities the vulnerable communities of Pere and OnaKeto should dwell on, while section 6.7 sums up the chapter.

6.2. Current implementation plans

As outlined in section 5.4, the current climate change adaptation implementation plans developed by Pere and OnaKeto are based on their local experiences of the environmental changes imposed upon them by variability in the weather and climate cycle. The environmental changes are livelihood threatening so the villagers planned on executing some of the activities that would enable protection of their livelihoods. As summarised in Table 6-1, there are a number of activities the villages have been anticipating. These anticipated adaptation activities are perceived as important based on their geographical locations and experiences.

Table 6-1: The current communities' plans to cope with environmental changes triggered by climate variability

Pere	OnaKeto
*Planting more mangroves as part of the seawall building *Planting of drought resistant crops such as wild taro, and *Fundraising to secure funds for the implementation of a water supply project for the village *Supporting LLG in the implementation of Ecosystem-based Management Plans	*Expanding the reforestation programme *Planting of drought resistant crops such as African yams for all the community.

Pere village

For Pere village, their plans are to plant more mangrove seedlings and drought resistant crops such as wild taro (see figures 6-1 and 6-2) and establishing a freshwater supply system. Mangrove planting was intended to slow down the sea current during high-tides so the sand is trapped in the backdrop. Based on my conversation with Manuai of TNC, this approach is only based on what they think can work well for them and if it is proven successful, the shoreline erosion will be arrested once the sand has built up some 10 metres away from the highest level of the high-tide zone (Manuai Matawai, July 2011: pers.comm). Similarly, the wild taro is a plant that is found within the Pere village. According to the villagers, the taro species does not die during a prolonged dry season. At the same time the taro is edible so without waiting for any external assistance to identify the best option to accept for food security, they opted for the locally available resource in place of sago and sweet potatoes; which are susceptible to drought and increase salination (various communications with Pere villagers, July 2011). Though the taro is locally available, local people have never consumed it like other food crops and they will have to learn to accept the taste when disaster like drought occurs again.

Figure 6-1. Mangrove seedlings planted at the highest high-tide zone to trap sand to enable shoreline protection from further erosion (source: author, July 2011).

Furthermore, the community has an issue with the freshwater supply system available in the village. And since their only source of freshwater was pumped by a diesel operated water pump (see figure 5-4), which was out of order owing to the issue of maintenance cost, the villagers have to source freshwater for cooking and drinking elsewhere. It was difficult without any proper freshwater for the village so they opted to raise funds internally and externally to purchase Tupper tanks for each household so they can have enough water for consumption. They believe the purchasing of Tupper tanks for each household was a better option than continuing to fix and maintain the water pump. The cost of maintenance is too high while the Tupper tanks are good because the area receives

a lot of rain throughout the year so it can sustain them (Ward members & Environment and Climate Change committee, July 2011. pers. comms) if every household has its own tanks.

Apart from this activity the Pere Alalau Association plans to take on board the Nali Sopat Penabu LLG's ecosystem based management plans. The ecosystem approach to adaptation is about planning and developing adaptation strategies using ecosystem services such as conservation of reefs and marine resources. The philosophy behind this approach is that through ecosystem management, it is possible to respond to the climate change impact through conservation of life supporting plant and animal species (Nkem, Idinoba, Santoso, & Saborio, 2008). So the LLG has this holistic approach to promote climate adaptation projects and since it is in line with the Pere Alalau Association's activity toward arresting climate change issues, they can network and collaborate on implementing some of the ecosystem based activities such as coral reef protection for food security. Nkem and others (2008) argue that ecosystem approach provides a robust approach to adaptation that has general applicability and implications for poverty, food security, and the rural energy security framework for livelihood sustenance. Hence the Pere Alalau Association will take this approach on board as the LLG programme directly supports their programme activities. However, the LLG's plan was made available as requested so it cannot be commented on, but the general capacity for implementation of programmes and support from partners such as LLG towards the communities' initiatives are discussed in Chapter 8.

Figure 6-1. Wild taro seedlings grown in a water-logged area, Pere village (source: author, July 2011)

The OnaKeto villages

As a highlands community that is situated at an altitude of around 1800 metres above sea level, the climate change impact experiences in this region differ from those in Pere village. Thus the adaptation strategies developed differ in many respects. The climate change related extreme events experienced by OnaKeto villages are high rainfall triggered land and mudslides, as well as the prolonged dry season triggered by the El Nino Southern Oscillation. ENSO was a phenomenon experienced throughout the country in 1997 and also in February 2011. Nevertheless, the adaptation plans as indicated in Table 6-1 aim at expanding the reforestation project which was supported by Partners with Melanesia-a NGO to stop the expansion of grassland while restoring the biodiversity. At the same time, the reforested areas will help in reducing the onset of landslide events. An example of the success of the reforestation project is shown in figure

6-3. The area where the trees are seen growing was once barren land. Based on the success of the reforestation project, the OnaKeto villages plan to expand the project further to other barren lands (OnaKeto villagers, August 2011. pers. comms).

In response to the prolonged dry season and as a part of food security measures, the villagers planned to plant drought resistant food crops such as cassava and African yams. Cassava is a plant that is common to PNG while the African yam is a species that was introduced by the National Agricultural Research Institute (NARI) in the late 1990s. Since then the crop has proved successful, growing almost in any soil and climatic conditions in the country. NARI introduced the crop because it can grow well in Africa's (the place of origin of the yam) savannah soil and harsh climatic conditions. The introduction of the crop to OnaKeto village is recent (2010) but people expressed seeing the yam growing well and they hope to harvest a good yield (Kumoro, August 2011: pers.comm).

In a contrasting way, the NGOs, state institutions and the donor agencies have a different approach to addressing climate change in terms of adaptation initiatives. They focus on developing policies, conduct advocacy and awareness and provide technical training. From the outset, their proposed actions can be asserted as a step towards helping vulnerable communities either directly or indirectly. However, the various approaches that take place within the hierarchical structures are such that the levels will interact with each other's approach and the communities' so the aim of adaptation is achieved (Adger, et al., 2005:77). Table 6-2 depicts the hierarchical structure of planned interventions by

different groups. The main area of focus for each group is firstly to research and develop a policy framework. CELCOR, a legal NGO with OCCD and DNPM are well placed to consult, identify and formulate general climate change policy that can include adaptation programmes.

Figure 6-2. One of the reforested areas of land in OnaKeto villages to restore biodiversity while stopping soil erosion and reducing CO_2 gas concentration in the atmosphere (source: author, August 2011)

Secondly, there is a need for external support for community project implementation. AusAid, OCCD, WWF, WCS and DNPM have programmes and plans to support the communities directly. Their involvement includes the provision of awareness and education programmes while encouraging local communities to take the lead in implementation activities. This initiative is contrary to the direct implementation activity by some other organizations or agencies. In this case, OCCD, RCF, WWF, and WCS

have plans to promote actual adaptation activities by playing the leading role. WWF and OOCD for example have plans to plant mangroves along the PNG coast by having their field staff directly involved (WWF and OCCD staffer, August 2011. pers. comm). Nevertheless, the foremost important initiative that was identified by OCCD, WWF and DNPM is the financial needs of a community driven project. They anticipate raising funds for the project while networking and establishing bilateral or multilateral agreements for collective actions within the region and across the globe.

Table 6-2: The focused climate adaptation activity each participating group anticipates implementing towards achieving effective adaptation

Focused activity	Group's main role/function
*Research and develop a policy framework including raising awareness	*CELCOR, OCCD, DNPM
*Support implementation of the climate change projects	*AusAid, OCCD, WWF, WCS, DNPM
*Provide funding support	*OCCD, WWF, DNPM
*Collaborate and establish bilateral/multilateral agreements	*OCCD, WWF, DNPM
*Become directly involved in climate change adaptation projects	*OCCD, WWF, RCF, WCS

Such plans with all participating groups are crucial to build adaptive capacity as IPCC (2007) argues there is uneven capacity to adapt effectively across and within societies. Moreover, it is important to say that the role of state institutions, such as OCCD and

DNPM, in adaptation can be seen as distinct because central governments have a specific role in establishing the regulatory environment to encourage adaptation by individuals, households and private sector businesses (IFRC, 2009). Thus, section 6.2 discusses further the length of time each group has been involved and ascertains whether their current programmes are the continuation of their past implementation experiences.

6.3. Timeframe for implementation

The length of time a group or an organization has been involved in a climate adaptation initiative is essential in this study. It is important to talk about as well because, like other parameters discussed, the temporal scale will indicate how much effort has been put in by each of the concerned parties including the status of the adaptation activities and its intended outcomes experienced. Hence, it will help this study to understand fully the correlation between the government's established programme and the community initiated project implementation on a temporal scale. With reference to this notion, the climate change adaptation concept was accepted in 2007 (Ayers & Forsyth, 2009; IFRC, 2009; Mercer, 2010). Initially the climate change arguments were based around mitigation through reduction of green house gas emissions at the source, or increasing carbon sequestration through reforestation and better land use management (Ayers & Forsyth, 2009). However, regarding the current trend in adaptation activities, as table 6-3 shows, there is evidence of variations in actual implementation initiatives in PNG to date. The variation in implementation and the results experienced is likely attributed to by the

amount of exposure to the climate related risks by communities or the shift in organizational programmes of work (Adger et al., 2005) by each participating group.

The involvement time for NGOs and donor agencies indicated as 2 to 4 years corresponds to the UNFCCC's 2007 declaration to accept adaptation into climate action activities. It is an indication that these organizations were part of or took cognizance of the outcomes of the UNFCCC meeting and rapidly changed their organisational programme of work and accepted adaptation as a key component of their work. Conversely, the two state institutions (OCCD & DNPM) have being communicating on climate adaptation for less than 2 years. One of the key reasons for the late start, as stated in DNPM's report of 2010 for climate change policy, was so they could have the necessary background information on data before they embarked on climate change programme establishment. A similar situation stands for Pere village but more importantly, their time of involvement is the result of how much exposure they had to the climate change issues. It was not until 2009 when they had extensive awareness of climate change projects carried out by NGOs, and the community became aware of the issue by relating it to their local experiences, that they began to react and hence plan and implement adaptation projects (Environment & Climate Change Committee, July 2011: pers. comms).

OnaKeto villages show some interesting case examples of community reactions to climate change in PNG. They have had exposure to NGOs since 2005 and adopted the idea of reforesting grassland for restoring biodiversity, mitigating greenhouse gas emission and as livelihood security (firewood, building materials and watershed

management) in 2005. Two years later, they realized and took on board adaptation projects (Kumoro & Mondiai, August 2011: pers.comms), directly or via NGOs in response to UNFCCC's call for climate change actions through adaptation (IFRC, 2009).

Table 6-3: The length of time each participating group has been involved in climate change issues up till July 2011.

Organisation / institution/group	Length of involvement (Years)	
	1 or less	2-4
Pere village	√	
OnaKeto village		√
DNPM	√	
OCCD	√	
Ausaid		√
CELCOR		√
RCF		√
WCS		√
WWF		√

6.4. Important variables that can encourage community participation

Communities affected by climate change induced disasters should be given the maximum opportunity to participate in emergency relief programmes of adaptation activities

(Harvey, Baghri, & Reed, 2002). Participation means contributing ideas, making decisions and taking responsibility. Hence, Harvey and others (2002:177) describe community participation as 'the involvement of people in a community in projects to solve their own problems'. This definition can be used simultaneously in climate change adaptation initiatives that target reducing community vulnerability to climate related disasters. Table 6-4 shows the summary of community groups and the stakeholders' perspective of incentives that can encourage active participation in adaptation.

For Pere village and OnaKeto villages, "food security" and "maintaining income generation activities" are regarded as important. The reasons for regarding these two themes as important because of their prominence in daily sustenance support. Adaptation to climate change is about safeguarding people's livelihoods. If the two project sites are to achieve their anticipated goal of effective adaptation, the likely chance for people to participate is to promote projects that can alleviate risks to daily sustenance. Food is an essential component of living while the maintenance of income to support other areas of daily needs is equally important. As Ayers and Forsyth (2009:26) argue, 'community-based adaptation takes the approach of adaptation as development' so it is imperative to maintain the status quo for their daily well being.

The NGOs, state institutions and donor agencies on the other hand anticipate capacity as important for community participation. Their presumption is supported by IFRC's assessment on strategies for local impact: 'the level at which impact is achieved will be very dependent on the existing capacity of those taking actions and the level of

information available about the expected changes in climate and the effect at the local level' (2009:4). Nevertheless, different groups have identified varying variables. WWF and WSC for instance have identified "awareness raising on socioeconomic", enabling communities to make informed decisions to initiate and manage climate change projects", and "providing adequate financial and technical support" as important.

Table 6-4: Organisations' and groups' perspectives on the incentives that can encourage communities to take part in climate adaptation activities

Perspectives of important variables	Organization/Group
*Food security	*Pere Alalau Association
*Maintaining income generation activities	*OnaKeto People's Foundation
*Raising awareness of the socio economic vulnerability of the community	*CELCOR, AusAid, WWF, RCF, WCS, DNPM
*Enabling communities to make informed decisions to initiate and manage climate change projects	*CELCOR, OCCD, WWF, RCF, WCS
*Provide adequate financial and technical support	*WWF, RCF, WCS, DNPM

Taking the variables identified by NGOs, state institutions and donor agencies from a different angle; it can be discerned that "raising awareness on the socio economic vulnerability of the community" is of greater importance for the community's meaningful engagement. That generalization agrees with the local communities' perception of maintaining the status quo of their wellbeing. However, the other variables that have been identified are equally important for building adaptive capacity in promoting participatory

implementation. In section 6.4, the concept of adaptive or institutional capacity for effective implementation is described for further clarification.

6.5. Institutional capacity for project implementation

The institution in this section refers to Pere Alalau Association and OnaKeto Peoples Foundation as community based organizations that were purposely established to address socioeconomic and climate change issues in their respective locations. Capacity on the other hand can loosely mean the resources required for an institution to function to its greatest potential. Hence, institutional capacity herein refers to the level of technology; information and skilled staff, infrastructure, and finance that the two community-based organizations have that can enable a prompt response to implementing adaptation activities (Mimura, et al. 2007; Adger, et al., 2008).

The Pere and OnaKeto people have however, realized that they do not have the capacity as defined by Adger, Mimura and others to successfully address vulnerability issues. They have instead opted to network, collaborate and partner with organizations or groups that hold similar views on adaptation to climate variability. OnaKeto villagers have so far sought financial assistance from donor agencies such as Global Green Grant Funds, the International Union for the Conservation of Nature, and the WWF. At the same time they have sought technical assistance from the PNG Forest Authority, the PNG Forest Research Institute, the National Agriculture Research Institute and Partners with Melanesia. Technical assistance is in the form of skills training for improved planning

and management by the communities (OnaKeto villagers, August 2011: pers. comms). Likewise, Pere villagers have collaborated with the Nali Sopat Penabu LLG to assist in raising funds and purchase of materials for a freshwater supply and mangrove planting. And at the provincial level, Pere, with external NGOs such as TNC, WWF and WCS, the LLGs and the Provincial Government including universities and research institutions have signed a memorandum of understanding in April 2011 to address climate change issues collaboratively (TNC staffer & ECCC, July 2011: pers.comm).

The issue of organizational capacity in the community to fully implement adaptation effectively is seen as an impediment. Nevertheless, some of the useful recommendations from partner organizations or agencies to help communities to achieve their anticipated goals come firstly from the OCCD. This state institution suggests that:

> Government, communities and NGOs will have to work together on activities and the policies so PNG can adapt well to climate change in the future. There has to be support from all areas, on technical, and financial support and also capacity building. There must also be proper coordination at all levels (OCCD Policy Analyst, August 2011: pers. comm).

Secondly, a similar standpoint was shared by the WWF that:

> Climate change is real and in a country like PNG, it is difficult to do awareness by producing pamphlets/brochures/climate talk shows on radio and internet, because

> people do not have access to such tools so we have tried doing these but we cannot evaluate and monitor the impact of awareness work – although Awareness is very important as we have discovered. Maybe the use of drama/plays/concerts can be used to make people become aware of climate change and its impacts, so people can understand better. Remember people can't read; no radios, no internet so you can already see the picture. Once people understand the effects and the issues then they can become part of the efforts to try out adaptation and mitigation measures with partners including WWF, Governments, and all stakeholders. Community participation including ALL levels of Government is also important, because many of our leaders and policy makers are also new to this concept, so we need to build their capacity before they can incorporate some of our plans into their (government) work plans and budgets for good outcomes (Banka, June 2011: pers. comm).

In essence as per WWF's suggestions, PNG communities need a clear direction in the area of institutional capacity where the focus shall include 'empowerment, social capital, and an enabling environment, as well as the culture, values and power relations' that influence decision-making (Willems & Baumert, 2003:10). This could be a holistic view on the concept of institutional capacity, but for Pere and OnaKeto as the situation is now, it seems that they need to have a basic know-how skills and resources to help them define and promote their adaptation initiatives.

6.6. Priority adaptation project for Pere and OnaKeto communities

Similarly to the concept discussed in section 6.1 (current implementation plans), this section (6.5) looks at the priority aspect of the identified problems (vulnerable areas) and the order of adaptation responses (Mimura, et al., 2007) by the communities of Pere and OnaKeto villages. Prioritizing adaptation activity is essentially the act of giving attention to addressing issues that are of priority by targeting areas that will reduce life threatening hazards. From a methodological point of view as Niang-Diop and Bosch (2004:193) state, the threats from climate change are not essentially different from what people have been experiencing climate hazards in the past. Climate change is an on-going event that occurred over time (Niang-Diop & Bosch, 2004). Therefore, the selection and prioritization exercise need not differ either. However, the increase in frequency and intensity of extreme events puts more emphasis on the treatment of uncertainty and risks. Hence the priority exercise for vulnerability reduction that was evaluated and categorized by the two communities is based on a similar notion of frequency and intensity of extreme events experienced in their locality.

Though the communities have not highlighted the priority activities in any preferential order, the summary list as in Table 6-5 indicates the activity that is important for Pere and OnaKeto. And the priority activities are based on the risks experienced and feasible ways to cope with the disaster if they are to accept these identified activities and engage with implementation processes (IFRC, 2009). Nevertheless, the activities identified for Pere

and OnaKeto are on a local and needs basis. For Pere, the building of the seawall will enhance protecting their village and their cultural and sacred sites from the rising sea, which is destroying these areas. Similarly, the food security measures will protect them from starvation as their livelihood is dependent on local food. Planting of drought resistant crops including sago and restocking coral reefs will surely maintain their sustenance.

OnaKeto on the other hand regards livelihood support as important. Therefore, activity such as growing drought resistant crops of high yield and suited to the highlands climate is highly valued. Additionally, the continuing reforestation project will maintain biodiversity and reduce the onset of landslides, eventually protecting their village and livelihoods.

Table 6-5: Summary of priority adaptation activities for Pere and OnaKeto villages

Immediate priority activities	Group's choice	
	Pere village	OnaKeto
*Building of seawall	√	
*Fundraising to purchase water tanks, and empty drums for mangrove planting	√	
*Planting wild taro and sago for food security	√	
*Planting and restocking of corals to attract fish	√	
*Awareness of reforestation to other villages		√
*Continuing reforesting grasslands		√
*Growing of drought resistant crops such as African yams, cassava and bananas		√

6.7. Chapter summary

Climate variability in recent times has affected the livelihoods of the Pere and OnaKeto communities; and they have proposed or initiated adaptive measures such as the planting of mangroves to trap sand to enhance shoreline protection or reforesting barren grasslands to arrest landslides during heavy raining seasons. Moreover, the adaptive measures are given priority based on the needs and abilities of the communities; which are livelihood sustenance activities. These are the positive moves; however, they (the communities) lack basic knowledge and skills on appropriate adaptation methodologies, and their involvement in adaptation activities is fairly recent –starting in 2008 and onwards. Given such a situation of lack of experience and knowledge, skills, and finance, NGOs on the one hand have taken the lead in supporting the work of the communities in the form of providing awareness, training and assisting proposal writing for funding. While local institutional capacity can be enhanced by such an approach, the question surrounding the feasible adaptive variables for the rural communities remains. As such, chapter 7 discusses some of the variables that have proved successful elsewhere within the Asia Pacific region that PNG communities can adopt and replicate to sustain their livelihoods.

7.0 Adaptive variables: a community response to climate change

7.1. Introduction

Adaptive variables are parameters that can, in practice, make vulnerable communities respond to climate change in a positive way. In essence, they can be used to successfully adapt to the changes through adaptation and utilization of the suggested best approaches. As discussed in chapter 6, the communities of Pere and OnaKeto are engaged in adaptation activities; however, this chapter looks into the experiences of their successes and failures, and determines whether their experiences could be modified replicated elsewhere. The chapter also analyses the characteristics that make the process of adaptation effective by focusing on social resilience, the role of social networks, institutions, and innovation within the context of global climate change (Osbahr, et al., 2010).

Section 7.2 looks at the success stories from the perspective of the case study communities, and from the government, NGOs and donor agencies, while section 7.3 discusses the case studies perspective alone. Section 7.3 is framed in this way because the problems the local communities (case studies) face are more relevant for use if an adaptation project is to be designed for successful implementation. Section 7.4 seeks suggestions from both case studies and others (government, NGOs and donor agencies),

taking into consideration experiences from the local situation, and externally for adoption elsewhere in PNG. Thus people can be helped to adapt successfully in disasters exacerbated by climate variability.

7.2. Success stories: practitioners' perspectives

A success in climate change adaptation can be defined when an adaptation approach does not affect the other users of a system. An example is the case of farmers irrigating food crops upstream during a prolonged dry season, but not depriving users of water downstream (Osbahr, et al. 2010). As Osbahr and others (2010:3) further describe, in a socio-ecologically connected community, 'the desirable normative goals should be the enhancement of resilience of social-ecological resource systems' where the approach would allow for flexibility and perseverance of a system in a state that provides resources and services to users. In this sense, success would only be upheld when the adaptation approach does not compromise the well being of other members of a community within an ecosystem.

Hence, in taking the example of success stories from Osbahr and others into consideration, the following section exemplifies successes from the practitioners' perspectives, and is divided into two parts. The first part analyses the perspectives from the case studies. The experiences are from the adaptive activities the people have so far been engaged in and how they help in their drive towards building resilient societies through climate adaptation processes. Part two analyses the perspectives from the

external agencies that work in partnership or collaboration, and in networking across temporal and spatial scales to understand what their experiences are. These are worth mentioning as they are successes or experiences that could also be adopted or replicated elsewhere.

7.2.1. The case studies

From the case studies' scenario, there are a number of actions and adaptation activities that have proved successful, although these system feedbacks are not measured by the length of time an event occurred, or any specific indications of long-term livelihood resilience. What is outlined in Table 7-1 generally reflects the activities that were undertaken and the kind of responses that were received, including the support gained from within or outside the communities.

For the Pere community, there are three socio-ecological events that prove positive in their ambition to build a resilient livelihood. First of all, there is the role of informal village institutions in livelihood coping responses and, as Osbahr and others (2010:7) describe, 'informal networks within a village are central to the everyday system of dependence; bonded ties are the reciprocal relationships between friends and family to exchange services and goods'. Thence, there are support and cooperation from the groups and institutions within the Pere village towards the Pere Alalau Association's drive to build resilience in the community. The Ward Council for instance, is supporting the work of the association, and the village council of chiefs is likewise providing similar support

(Ward 14-18 Councilors, July 2011: pers.comms). The spirit of working together strengthens the relationship to address adaptation issues collectively and with a positive outcome.

Secondly, the ecological approach to securing food for local consumption during drought seasons, while protecting beach erosions, includes the successful growing of wild taro and mangroves. Table 7-1 provides a general description of the positive responses the Pere community experienced. The mangroves are growing well with the owning wards monitoring the growth on a daily basis. Similarly, the wild taro is showing some positive signs by growing well after transplantation and the community hope that it will support them during the drought period.

OnaKeto villages, on the other hand, have indicated that two of their adaptation activities have produced positive results over the years. As Table 7-1 shows, the reforestation project has gradually seen the return of wildlife, the stabilizing of the soil structure, revitalizing of the freshwater system and slowing down of soil erosion and landslides. As a result of these positive indications from reforestation, the other tribes from the neighbouring villages have requested that the project expand its boundary to cover their villages as well. However, their request will be attended to when PwM and OKPF have secured additional funding and other needed resources (Mondiai, August 2011: pers. comms).

Table 7-1: Summary of successful adaptation initiatives by the rural communities

Response	From	
	Pere	OnaKeto
* Community support and cooperation is there.	√	√
*Mangroves are growing well and being monitored daily by owning Wards.	√	
*Trial planting of wild taro tends to grow well and it will support the population during any prolonged drought season.	√	
*The reforestation project is proving a success; trees are growing well and neighbouring villages are requesting the expansion of the project; wildlife and other native plants have returned to the reforested areas; soils have stabilized and there have been no apparent landslides within the area.		√
*After some awareness of climate change, we have seen people taking initiatives to plant drought resistant crops.		√

On an equally important note, the Field Coordinator of OKPF acknowledges the initiatives undertaken by the OnaKeto people to grow drought resistant food crops after a limited awareness conducted to raise their understanding of the impact of climate change and its variability (Dava, August 2011: pers.comm). The level of interest and implementation of activities by communities themselves is described by Osbahr and others (2010:9) to signify that collective actions and self initiatives are critical to the promotion of successful adaptation pathways through the response space. The people of

OnaKeto will eventually grow a variety of crops to secure a stable diet during the prolonged drought seasons in the highlands landscape.

7.2.2. The state institutions, NGOs and funding agencies

In addition to the experiences portrayed in the case studies above, the state institution, NGOs and funding agencies' successes are measured in terms of their programme goals and objectives. That is, how much they have implemented their set activities within a given timeframe and the extent to which the target communities have accepted them, including expanding the activities locally. There are three categories to rate the success of each participating group: low, medium and high. Those groups that indicated a low success rate based it on their assumption of achieving little or that nothing much had been done to date with their priority activity. A medium success rate signifies that though the institution's activities are implemented, the set objective is not fully met. Conversely, a high success rate signifies that the institution's set objectives are fully met.

For the groups that responded, only the Department of National Planning and Monitoring has indicated achieving a low success rate in its programme activity implementation. The following is an account of its reasons behind rating its success as low:

> Climate Change is new and a challenging development issue for PNG. Currently the Government has been addressing impacts of climate change such as sea level rise and the cholera outbreak in a responsive manner. The Office of Climate

> Change and Development is a client agency to the Department of National Planning & Monitoring. Its role is to coordinate all Climate Change initiatives in PNG. OCCD is currently in the initial stage of establishing Monitoring, Verification and Reporting Systems, Adaptation and Mitigation for PNG. They are also in the process of meeting international partners forming bilateral and multilateral agreements under the UNFCCC. For instance the REDD+ mechanism which is also being coordinated by our Foreign Aid Division

The other participating groups such as CELCOR, AusAid, and WWF have indicated that their programme activities have had a medium success rate. The following are the responses:

> CELCOR's Climate Change campaign aims at providing awareness to communities on what is climate change, cause and effect etc. CELCOR aids communities with identifying the main climate change issues within their communities and how they can be addressed. We advise communities of the various partner NGOs and Government departments that address mitigation and adaptation. Communities' reporting back of their engaging in adaptation or mitigation projects allows us to assess CELCOR's impact within the community and area as a whole.

AusAid has alleged that:

> The partner government is not prepared to take on the initiative AusAid had supported.

Moreover, WWF explained that:

> People living in coastal communities especially have understood why it is important to implement mitigation and adaptation strategies because they can see the effects of coastal erosion and why it is a threat to them. In the communities inland, they have yet to really grasp the effects of climate change because it may not be a life-threatening situation, so we need more awareness in these areas and discuss the effects of food security etc in the inland communities – which needs a fair bit of effort on the awareness side of things.

With the high success rate, the following have explained why they believe their group has successfully implemented its programme activities. Firstly, OCCD explained that:

> The OCCD has had success in the coordination of activities with different stakeholders and also consultation at the Provincial level with regards to development of climate change mitigation / adaptation activities. OCCD's main role is to coordinate climate change related activities and has been successful working through the technical working groups.

In a similar manner, RCF describes its accomplishments as follows:

> We began with a lot of awareness on the issues relating to climate change so that enabled the communities to have a sound understanding of the issues. They have now taken ownership of the community reforestation project that we initiated with them.

And WCS explains that:

> We do information sharing with people we work with. Empowering them with information to adapt to the new changes that are happening is an important part of our project. We acknowledge that people want to help themselves, people are not lazy – if we make information available they can help themselves. We also try to point them to relevant sources of information.

In summary, the case study experiences are based on actual adaptation and coping activities undertaken by the Pere and OnaKeto communities, while other participating groups' experiences are based on the accomplishment of their organizational programme activities. And these testimonies are their experiences over certain 'temporal and spatial scale', however, it cannot be a standard success story for adaptation initiaties in PNG (Adger, Arnell & Tompkins, 2005:80).

7.3. Problems encountered in implementing strategies: case studies' perspectives

In an attempt to implement climate change adaptation projects effectively, the case studies have indicated some of the acute problems that seem to have hindered their progress despite the successes as mentioned in section 7.2.1. Adaptation is made up of actions throughout the communities, by individuals, groups and government. Hence it is motivated by many factors, including the protection of economic wellbeing or improvement of safety (Adger, Arnell & Tompkins, 2005:77). The successes depend very much on actions and support from these groups and the motivating factorThe communities have not only experienced success but have witnessed a number of set-backs as well and these are summarized in Table 7-2.

The Pere community has identified lack of funding and training from the government, including non complementary planning by the LLG in its recurrent plans. Though the LLG and the provincial government have recognized the community's aspirations, their response in a timely manner is insufficient. The Pere Alalau Association with support from the communities has identified a number of adaptation activities to implement, however there is no funding to purchase certain materials needed, and no technical training on research and identification of appropriate adaptation methods for implementation.

The OnaKeto community on the other hand has identified problems such as the lack of adequate awareness, materials, tools for reforestation and has similar concerns to those of Pere on the lack of government support. For example, an observer in Mangiro village (OnaKeto) expressed concern that NARI does not seem to get out and conduct its outreach activities effectively. Similarly, another observer in that same village pointed out that they have been struggling to survive because of lack of support by the government in addressing their aspirations to excel in socio-economic development. These are the common problems that hinder the progress of building resilience among the vulnerable communities. As per the two case studies' concerns, the government support in terms of funding, adaptation materials, and deployment of field extension officers (agriculture) are not provided. For the adaptation project to be successful and effective, the support and coordination is required from all stakeholders. As Adger, Arnell and Tompkins (2004:81) describe, 'effectiveness relates to the capacity of an adaptation action to achieve its expressed objective', and the capacity can be increased with appropriate support on a timely basis (Osbahr, et al., 2010).

The communities of Pere and OnaKeto have the ability to self-organise and learn both shared and new knowledge, but that can be further enhanced once the government, including NGOs provides necessary support such as technically skilled officers in agirculture or construction engineering, and annual allocation of adaptation fund. These supports would help the community actions to endure, hence building a resilient society (Osbahr, et al., 2010).

Table 7-2: Characteristics that are seen to impede successful adaptation in Pere and OnaKeto

Response	From Pere	From OnaKeto
*Lack of funding and training support from the government	√	
*Lack of cohesive and complementary planning and implementation of programme plans with LLG	√	
*More awareness materials needed for climate change awareness and education programmes.		√
*Lack of tools to continue reforestation projects		√
*Lack of government support in the initiatives undertaken by villages.		√

7.4. Suggestions to strengthen future climate change adaptation projects in PNG

Taking into consideration sections 7.2 and 7.3, this section discusses the opportunity that is available to further strengthen the adaptation activities. The suggestions are based on the observations and experiences of both the case studies and the external institutions that support the work of the communities. It is, however, important to point out here that the suggestions may rarely work well across a spatial scale and is only the perception that the participating groups have of effectiveness within the landscape in which they work.

In the following sections, the first part discusses the observations and experiences from the perspective of the case studies, while the second part discusses the perspectives from the state institutions, NGOs and funding agencies.

7.4.1. The case studies perspective

From the communities' perspective, they have suggested a number of things that require actions from industrialized nations including support from external groups and local action. Though there was no formal situation analysis conducted (see the example in Mercer 2010), the following list as shown in Table 7-3 generally contains the points of view and experiences of the communities.

The first action that the Pere community thought would help solve the climate change issue in general is requesting the industrialized countries to cut down their CO_2 gas emissions. The CO_2 gas is commonly regarded as the main cause of global warming due to increased burning of fossil fuels, deforestation and other form of agricultural-based activities. Concentrations of the gas have accumulated over the years, thus warming the earth's surface and resulting in the melting of ice caps as well as an increase in the occurrence of tropical cyclones because of the rise in sea temperature (MA, 2005; UNFCCC, 2010). The call by the Pere community is well echoed across the globe in the 21st century by UNFCCC and other climate action groups as a direct approach to reducing greenhouse gas emissions thus halting the increase in sea level rise. This rise

poses a risk to many coastal and low-lying atoll islands, especially in the Asia Pacific and the Caribbean regions (UNFCCC, 2010). This call requires a policy shift to promote clean development mechanisms such as producing and using biofuels, solar or wind powered electricity and promotion and implementation of REDD concept that are regarded as environmentally friendly.

Moreover, from the local experiences and actions, the Pere community acknowledges that building a seawall and the provision of an alternative source of freshwater are the ways forward for adapting to climate variability. They know that there is no other way to protect their villages and get fresh water owing to the rising sea level that threatens the erosion of the shoreline while inundating the freshwater sources. Their ecosystem approach by growing mangroves along the current high tide level as a natural barrier to reduce the sea's effect would protect the shores and the freshwater sources. Such an ecosystem-based adaptation has so far proved a success for countries such as Kenya, Madagascar and Kiribati (Reid, Huq, & Murray, 2010) and Pere's approach is the way forward so far.

The OnaKeto have identified the following as summarized in Table 7-3: sufficient funding for knowledge and skills to grow drought resistant crops, and mobilizing communities to address vulnerability locally. Furthermore, more trees on barren and grasslands should be planted to reduce landslides and CO_2 concentration in the atmosphere, while restoring biodiversity and protecting the watershed.

Table 7-3: The case studies' suggested parameters for strengthening adaptation in the future for PNG

Response	From	
	OnaKeto	Pere
*Demanding that the industrialized countries cut down their CO_2 gas emissions		√
*Building of seawalls as an interim action for coastal communities		√
*Provision of alternative water sources for island communities		√
*Sufficient funding and technical support needed from relevant government and other organizations, institutions and offices to plant appropriate drought resistant food crops and ways of addressing the vulnerability.	√	
*Planting of more trees for the highlands communities to arrest landslides while restoring biodiversity and maintaining watershed.	√	

The growing of drought resistant food and cash crops is new to the highlands and PNG communities, so institutions such as NARI need to step in accordingly. The communities need the skills of identifying, planting and nurturing the plants. At the same time, they require funds to purchase machinery; or they would have to purchase the crops and pay for the expertise required to maintain the crops. A WCS staffer pointed out clearly that:

> Papua New Guineans are self reliant and they are able to look after themselves. All they need is technical information and assistance and some money to kick start their projects (WCS staffer, June 2011: pers.comm).

Nevertheless, the funding need also applies to the expansion of the reforestation project. Though there is funding available from agencies such as UNDP Global Environment Facility (Reid, Huq & Murray, 2010:100), Ausaid, World Bank and ABD, the funds are not accessible by the vulnerable communities. This is either a result of communities lacking proposal writing skills, or the funding available within the government coffers is not disbursed to the communities. Despite such a scenario, the solving of this problem would enable successful adaptation by the vulnerable communities in rural PNG (Mercer, 2010).

7.4.2. The state institutions, NGOs and donor agencies perspectives

The external agencies believe that future climate change adaptation would be strengthened through the following ways as per Table 7-4. Out of the total of seven respondents (external agencies), encouraging and supporting community initiated projects is the preferred approach to enabling adaptation success. And it is closely followed by replication of successful projects within the region with adequate funding and technological support as the third highest priority for supporting adaptation. Encouraging and supporting community initiated projects was given the highest preference because the impact is felt by the rural villages and their initiatives are based

on local experiences, so if they are supported adequately, they can succeed. For instance, CELCOR describe it succinctly as follows:

> The people of PNG have survived on their land for many generations and have adapted to the changes. Communities need to be made well aware of the current climate change issues and taught how traditional adaptation can be intertwined and or incorporate with technological advances to better address climate change (July 2011: pers. comms).

Similarly Reid, Huq and Murray's (2010) compilation of community approaches to adaptation experiences from across Africa to Asia and the Pacific have indicated that success in adaptation remains with the initiating community, provided that adequate support is given by internal and external institutions that are environment and climate change oriented.

The second important point is about the replication of successful experiences from within the region. This can mean many different success stories: the testimonies range from social to ecological importance. From the social point of view, Osbahr and others (2010) reiterate that social learning and innovation help in identifying new possibilities for access to environmental resources, suggesting that the process of successful adaptation is a learned process. That is, collective self-organisation is important in this respect as it creates formal communication channels for structured innovation and bridge actors outside the village that can support the process. Ecologically, on the other hand, there is

the integrated approach (Mercer, 2010) where the planting of mangroves or drought resistant crops can help the communities cope with climate variability. If there is success elsewhere, it can be adopted to support communities in PNG.

In spite of these two points being ranked as high priority, the funding aspect of climate change adaptation projects remains similar in case studies experiences and the external agencies. RCF, in its commentary claims that:

> The Government of PNG must provide appropriate funding and technical support for both mitigation and adaptation activities in the country. This will empower the local people and other stakeholders to implement projects effectively (RCF, August 2011: pers.comm).

The climate change adaptation projects in PNG require sufficient funding and the skills to adapt well as rural communities lack such resources, while the NGOs directly working with these communities need adequate resources to support them. Adger, Arnell and Tompkins (2005:85) concluded that sustainability and resilience will be successful if technologies and institutional forms of collective actions are more widely available. Nevertheless, funding remains central to providing access to such technologies and the building of effective local institutions for actions that would see successful adaptation across PNG.

Table 7-4: State institutions, NGOs and donors' three suggested parameters that can strengthen adaptation in PNG

Suggested parameters	Total number of responses out of total of 7 respondents	Ranked: 1=highest; 3 = lowest
*Encourage and support community initiated projects	7	1
*Promote and support climate change adaptation projects that have proved successful elsewhere within the region.	6	2
*Adequate funding and technological support in a timely manner.	5	3

7.5. Chapter summary

Successful adaptation to climate variability depends on the preparedness of the local community and whether they have the skills, tools and resources to strengthen them to cope or if necessary support is provided to enhance their adaptation initiatives. From the experiences of Pere and OnaKeto; and from external institutions, there are some successful adaptation activities going on, however, the activities need more support to improve considerably. The details of the findings from this study and the first part of the thesis are discussed in chapter 8 as conclusions.

Chapter 8: Climate change adaptation in Papua New Guinea

This study was motivated by my interest in climate change and its impact on the rural population of Papua New Guinea. Hence this study was conceived with the main aim of examining whether community initiated climate change adaptation projects have blended in with, and challenged, the established programmes of the government of PNG and the NGOs. The findings from this study will contribute to the enhancement of climate change adaptation strategies, and to the support of adaptive projects in affected rural communities.

This chapter builds on the earlier chapters by presenting the key issues underpinning effective adaptation, and the implications that can enable appropriate policy development to promote effective and sustainable programmes and project implementation. In essence, this chapter begins with a discussion on the significant issues identified from this research. Following this is a reflection on the capacity of institutions to sustain their adaptation programmes and projects. The final sections discuss policy implications. Furthermore, the conclusion presents outcomes expected from the study and the way forward for PNG. The chapter ends with some suggestions for future studies.

8.1 The progress and challenges experienced

The progress and challenges discussed here are based on the key themes that arose from the conceptual framework, and the research findings. The intention is to highlight the progress and the challenges of each institution and organisation working on promoting climate change adaptation in the PNG context.

8.1.1 Government of Papua New Guinea

PNG has had a well organised system of governance and delivery of services with a stable democratic parliament for over 30 years. However, based on the information extracted through this research, it seems that there are governance issues still to be addressed and the effective delivery of services requires upgrading of existing infrastructure (DNPM, 2010b; National Strategic Plan Taskforce, 2010; Wickham, et al., 2010; World Bank, 2010). Coupled with the governance issue, it is noted that the national economy has been declining in recent years (Webster & Duncan, 2010) and the national development budget is deemed insufficient to support the functioning of all service mechanisms (BPNG, June 2011).

Despite the mixed socioeconomic and political situation, PNG has shown interest in improving and proactively addressing climate change by adaptations. This research identified that PNG is actively involved in global climate debates and actions. At the domestic level, the government has set up the national institution, the Office of Climate Change and Development, with specific directions to undertake and address national

climate change issues (OCCD, 2011). However, this study also finds that the climate change responses are not sufficient to systematically implement adaptations while addressing other areas of concern that pertain to climate change hazards and risks. That is, the communities who had initiated adaptation projects have indicated lack of support such as finance, advanced knowledge, and up-to-date information on climate change, vulnerability, impacts and preparedness. Sections 8.1.1.1, 8.1.1.2 and 8.1.1.3 discuss further the details of resources, infrastructure, and mechanisms that need to be provided by the state.

8.1.1.1 Financing

One of the main constraints in the successful implementation of adaptation activities has been finance. Despite better planning, and schedules for implementing certain tasks, the communities claim that lack of finance has hampered their progress. Similar sentiments are shared by NGOs and the state institutions. Such a situation is not only confined to PNG, but is a constraint that is common to adaptation activities elsewhere (Osbahr et al. 2010).

However, if there are funds for climate change adaptation activities in PNG, there need to be clear policy guidelines and distribution mechanisms to support the rural communities that are implementing the adaptation projects. At the same time, there is the need to build and strengthen capacity of NGOs and state institutions. As was evident from this study, the project based communities require some funding as a catalyst to enable them to access the materials or resources needed for supporting adaptation activities. A way

forward would be the setting up of the policy framework that could provide directions for funds to directly support community projects in a visible manner, with a clear distribution pathway, within a given timeframe. More importantly, there is a need to put strategies in place in order to increase the number of climate adaptation initiatives throughout PNG.

8.1.1.2 Communication and institutional capacity

Improved communication and institutional capacity to adapt to climatic variability is central to the effective delivery and implementation of projected goals and tasks. Though the current climate change adaptation initiatives are taking shape on the ground, there is a need to improve the capacity of the implementing agencies - state institutions, NGOs and community-based organisations. The institutional capacity includes human resources, communication technology, and infrastructures such as training or information centres to enhance provision, and delivery of needed information and resources on a timely basis. More importantly, as Osbahr et al (2010:10) explain, the 'ability to self-organise and learn both shared and new knowledge is critical to the process of innovation and livelihood resilience'. For PNG, more trained and specialist personnel are needed for climate change actions, while information and communication facilities will have to be set up both at the national, provincial, district, and community level to support and enable effective adaptation implementation.

8.1.1.3 Adaptation tools and technology

Technologically, PNG is not very advanced but as this study finding indicates, there are a few early warning systems for tsunami, and some weather recording stations scattered throughout the country. However, these systems are yet to be upgraded as they are almost or more than three decades old (DNPM, 2010a) and they do not always provide accurate information and data. Moreover, there is no equipment to measure rising sea levels, changes in wind direction, sea temperature, and changes in the freshwater mineral contents in both low lying and highlands areas.

Despite the lack of equipment and technology, the vulnerable and impacted people have been improvising and using available materials and tools. More importantly, the villages of Pere and OnaKeto have set up defence barriers such as mangrove and forest replanting as a direct attempt to promote adaptation; but it appears that if the government support and coordination is not present. The communities cannot continue to uphold the good initiatives they have started. This will be the likely case because past experiences in community initiated projects failed when communities needed more mentoring, skills training and some financial support. Thus, the communities of Pere and OnaKeto maintain that adaptation approaches will need to have appropriate technological and financial support from outside to enhance and strengthen their sustainable livelihood approaches.

8.1.2 Stakeholder involvement: the NGOs

A handful of environmental advocacy NGOs in PNG have played a number of important and complementary roles in climate change adaptation programme and project development. NGOs have so far lobbied and advocated on climate change impacts and programme development, both internationally and domestically, with government, private sectors and the donor agencies. More importantly, as this research has found, the NGOs have programmes of work and activities that work with Pere, OnaKeto and other rural PNG communities. They are also seen to have established a working relationship with the rural communities, and know the local situation well.

However, information gathered from this study indicates that they have insufficient personnel with sound knowledge on climate change and technical skills in innovating or supporting different adaptation methods. Moreover, NGO lack sufficient finance while their scope of work being limited to awareness and setting up of community-based organisations. Because of lack of needed resources and skills, they do not provide sufficient well timed support to the local communities. This study has found that NGOs assume rural people to be self-reliant and they want to promote such aspects. But realistically, NGOs' assumption leaves the rural communities to struggle to meet their project goals and aspirations when the communities lack access to expert advice on climate change, agriculture, and civil or construction engineering, including continuous some financial subsidy for implementing adaptation projects.

8.1.3 Project Implementation: The local communities of Pere and OnaKeto

The communities of Pere and OnaKeto are the case studies of those who vulnerable to, and being impacted by climate and environmental change. They have taken a practical approach towards project oriented actions. One of the significant findings from this study was the indications that local communities had the will to embark on a path of sustaining their livelihood and wellbeing without any outside groups such as NGOs or state institutions imposing their ideas. The communities have improvised with the use of technology, skills and resources that were available to them and that were within their means to initiate adaptation projects.

The Pere community managed to grow mangroves using empty 200 litre petrol or diesel drums with the hope of protecting shoreline erosion while identifying and replanting wild taro for consumption during a drought period. Similarly, the communities of OnaKeto had identified and replanted trees to retain soil fertility; maintain biodiversity and arrest landslides during heavy rainfall. The OnaKeto have also gone into planting African yam for consumption during the drought when other local food crops have wilted. The two communities' projects have seen success as the plants are growing well. Moreover, in order to maintain and govern the project, the communities have set up community-based institutions. Community-based institutions are known to have represented the community by negotiating and soliciting support from NGOs, state institutions, and funding agencies for enhancing and improving their projects.

Though there are positive approaches taken by the communities with positive results as stated in section 8.1.2, the sustainability of the community's approaches are yet to be assured. It was evident in this research that community cooperation and enthusiasm is highly visible, but most of the villagers are semi-literate with few educated up to secondary education, but with no further technical skills training or having any job experiences in a similar climate change related environment.

Thus, they will need to have skills in project planning, management, monitoring and evaluation. Furthermore, they will need to have expertise in forestry, ecology, agriculture and climatology. Compounding to that is the lack of funds needed to purchase or hire skilled workers and equipment to expand their current programme activities. Much of what is implemented as mentioned in the previous paragraphs was done on trial basis because of NGOs' awareness or from someone else's suggestions, which are basically had no connections to past experience of project sustainability. Essentially, rural communities need access to skilled staff, sustainable financing, and information and technology that would enable them to advance their activities with enduring results.

8.2 Reflection on the sustainability of climate change adaptation projects in PNG

There are number of lessons to be drawn from this study based on the main theme: the maintenance of rural livelihoods in the current stage of climate variability, risks and hazards posed by the changing climate. To date it cannot be confidently stated here that adaptation projects, in particular those promoted by Pere and OnaKeto, will be sustained

and expanded. The uncertainties in sustaining and expanding their activities remain because the support that they are receiving at present from government and partner NGO needs to be improved. At the same time, the community initiated projects are basically in the experimental phase so ultimately, the sustainable outcome of these projects is yet to be established.

Moreover, information on climate change adaptation projects done in the two case study sites or elsewhere in PNG is not documented and kept in a public domain for general use by responsible authorities such as the government, NGOs and research institutions. Thus, lessons learnt from these project sites are not made available for adoption and replication elsewhere. However, addressing the issue of sustainability at national and community level may sound over ambitious; but the prospects are promising. I must argue here based on the following reasons: firstly, a case example given by Ayers and Forsyth (2009) points out that promoting community initiated projects is the way to go. The main argument from their report is that communities will take ownership as they know and can overcome the problems they face daily. Hence, in PNG's case, there is willingness and self initiation of climate change adaptation projects by the affected communities in advance of outside influence.

Secondly, the stakeholder commitment is visibly present. The NGOs are involved in working and supporting local communities in a number of areas from environmental protection to advocacy and skills capacity building. Thirdly, with the success of African yam growing, reforestation, mangrove replanting, and cultivation of wild taros, there is

experience that can be replicated by promoting and encouraging these approaches in other affected communities across PNG.

The sustainability of climate change adaptation initiatives in PNG still requires improvements in coordination, sustainable funding arrangement, and documentation of lessons learnt for replication, to be coherently promoted by government and NGO.

8.3 Policy implications and recommendations

This study has important implications for discourses on climate change adaptation and the effectiveness of the current programmes and projects. The insights from this study will assist policy-makers, programme and project managers, decision-makers, and the project implementers, with a new body of knowledge that will help them to overcome the many challenges faced in project implementation. Since there is no documentation on the implementation of adaptation projects in PNG, the areas of importance for policy development which this study opts to highlight are governance and accountability, and appropriateness of the strategies that are currently employed.

8.3.1 Governance and accountability

The most important and urgent task for the government and NGOs is to improve the level of support and their commitment to enhance expansion in community initiated projects. As for the OnaKeto and Pere communities' adaptation projects, the local people can

manage to utilize whatever resources and skills that they can access. However, the communities need more support from state institutions and NGOs. At the same time, the government can improve its national extension programme for rural communities. For the rural extension programme, the government and NGO need to have mechanism in place to let their more skilled officers with background in agriculture, infrastructure set-up, research and information to assist local communities on a regular basis.

Because of a lack of coordinated support with necessities like funding and skills, the many areas of support for adaptation programmes at the village level are obviously lacking. It is therefore, the government and NGOs that should develop and establish climate change adaptation programmes in collaboration with local communities, so the correlation of projects and activity implementation must be clearly defined. Further to improve coordination, there is a need for the monitoring and evaluation of programme implementation by the central coordination unit, the OCCD, to ensure all anticipated outcomes are achieved.

Close monitoring of programmes and projects by the OCCD quarterly or bi-annually, would enable the promotion of successful adaptation activities on a timely basis.

8.3.2 Adaptation strategies

When collating information on the existing adaptation strategies employed by the state institutions, NGOs and the local communities, it appears that, in particular, the rural

communities that are vulnerable to climate change have chosen the best options that are available to them locally. Some of the most notable activities, as, have been the building of seawalls, mangrove planting, growing alternative food crops like wild taro, and reforesting barren hillsides to avert landslides. NGOs and state institutions, on the other hand, have strategies focused on conducting awareness and establishing community-based institutions with the aim of preparing them for self-reliance.

Given the PNG commitment at the national level, and success of local projects as at Pere and OnaKeto, the priority now is to improve the linkages between government institutions and local communities. That is, different organisations' and institutions' programmes need to be correlated with each other and linked to community projects within the country. The main goals of NGOs, state institutions and communities at the outset may appear similar in nature, but their targeted activities vary in scope. Hence, some of the state and NGO actions focus on awareness and advocacy at the national and international levels, and may not be directly in line with communities' adaptation projects.

As a consequence, there are a number of overlaps and gaps in the current strategies and there is a need for integration of programmes and activities by the state, NGOs and the communities with clear coordination mechanisms in place to support the communities' programmes or projects.

8.4 Conclusion

This study identified a number of positives and negatives of climate change adaptation initiatives in Papua New Guinea. The positives have been the determination of the local communities and the country as a whole to have a risk free and a prosperous livelihood. To achieve the risk free livelihood, PNG genuinely engages in international debates. More importantly, PNG actively partakes in a coalition of nations acting to reduce vulnerability. It also encourages self-help initiatives by vulnerable and impacted communities. In addition, environmental NGOs genuinely contribute to the cause through awareness raising and the establishment of institutions for both government and the communities.

Conversely, the study also identified considerable gaps among state institutions, NGO programme establishment and community-initiated adaptation projects. The main setback for the progress of adaptation initiatives has been in the areas of coordination, communication and institutional capacity. This includes a lack of updated and basic information. Such information includes climate variability and climate change, appropriate skills and technology, and documented experience of successful adaptation initiative elsewhere in PNG. Rural communities have taken their own initiatives but the success is not assured. Moreover, some funding is essential to supplement village resources as to ensure that adaptation work is promoted more widely. Similarly, from the same standpoint, information was not available on the best adaptation options and methods for replication in PNG. There is a need to organise information and the

production of new knowledge to make other communities more aware of climate change so that they can contemplate and take preventative approaches.

Nevertheless, despite the governance issue, there are obvious signs that PNG is moving in a positive direction with its attempts to address climate change issues. With both the positive and the negative implications of adaptation initiatives, PNG can seize this opportunity. Given that there is room to improve: perhaps the state's central coordination unit, the OCCD, including donors and other line-agencies, can develop policy frameworks that incorporate and build on the adaptation programmes that are already evident at the community level. These should promote strategies that enable local communities to take initiatives using local organization and materials. Such an integrated approach would enable successful implementation of the climate change adaptation programmes in PNG at both national, provincial, district and community level.

8.5 Future studies

This study is the first of its kind to be conducted for PNG when the nation needs to evaluate and document the experiences of climate change adaptation initiatives that are being implemented to date. The study is context specific and evaluates the adaptation aspect of climate change initiative by looking at two case study sites. This approach limits the opportunity of making fair generalisations on the effect of adaptation across different geographical boundaries and time. Though the responses from the two case studies have provided an in-depth understanding of the implementation aspect, both

projects have started fairly recently. The responses and insights gathered from these studies may not be representative of the many other similar projects implemented throughout PNG. Thus, the results can only be generalised based on the existing theory without drawing a specific conclusion on the experiences of communities in PNG to enable formulating a sound climate change policy.

The findings from this study can be used as baseline data to carry out further comparative studies, seeking additional information by examining their involvement from inception phase to their present state. At the same time, the sustainability of, and the specific outcome of adaptation methodologies employed can be assessed, while engaging in the development of integrated adaptation programmes that reflect the involvement of all stakeholders. In this way, in-depth insights gauged through a further comparative study should provide a clear pathway for developing climate change policy for implementing adaptation projects that can prove effective, and produce sustainable outcomes.

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Appendices

Appendix 4-1: Letter of acceptance from Pere village & OKPF

a) Letter from Pere Village

Pere Alalau Association
Nali Sopat Penabu LLG
P.O. Box 37
LORENGAU
Manus Province, Papua New Guinea

Date: Friday, March 11, 2011

To Whom it May Concern

The Pere Alalau Association is a community based organization that does Conservation work and we are doing climate change adaptation project. Our organization is willing to have Mr. Peter Bosip, a Master of Science student from the University of Canterbury to conduct his field work with our community.

However, should you have any queries, please do not hesitate to contact Mr. Chokal Manuai on this phone number: +675 7169 0736.

Yours Sincerely

Chokal Manuai
Chairman *-Pere Alalau Association

Witnessed by Pere 5 ward Councils:

Pondraken Pokakes	Benjamin Polume	Pokiap
Ward 16	Ward 15	Ward 17

N. Moelan
Ward 14

b) Letter from OnaKeto People Foundation

Ona Keto Peoples Foundation Inc.
PO Box 2028, Boroko 111
NCD - Papua New Guinea
Tel : 675 3236344 or 675 6966175 Fax : 675 3236345
Reg. Office c/-Partners With Melanesians Inc., 09 Croton Street, HOHOLA Section 36 Lot 003 - Port Moresby
Email : info@pwmpng.org.pg or kmondiai@pwmpng.org.pg

2nd May, 2011

To Who It May Concern

Dear Sir/Madam,

SUB: INVITATION FOR MR. PETER BOSIP IN OUR COMMUNITIES

The Ona Keto People's Foundation Inc. (OKPF) is a Community Based Organization in Watabung LLG, Daulo District, Eastern Highlands Province of Papua New Guinea. OKPF is engaged in Community Reforestation, Conservation Biodiversity and implementing Educational Awareness on climate change adaptation project.
On behalf of Ona and Keto tribes, OKPF is willing to have Mr. Peter Bosip, a Master of Science student from the University of Canterbury to conduct his field work with our community.

The members of the two tribes are looking forward to have Mr. Bosip in early August, 2011.

Therefore this letter is an invitation for Mr. Peter Bosip to come to our two communities to conduct his field work.

However, should you have any queries, please do not hesitate to contact me on +675 323 6344/+675 7113 1791 or email me through kmondiai@pwmpng.org.pg.

Yours sincerely,
.....
Kenn Mondiai
General Secretary
OKPF Inc.

A foundation setup in 2006 by the people to serve the needs, aspirations and wishes of the people of Ona and Keto tribes of the Siane ethnic group in the Eastern Highlands Province of Papua New Guinea

Appendix 4-2: Community introductory session plan

1. **Interview with individual (Association Chairman and NGO Project Coordinators)**

Date:…..July 2011

Time:……..

Venue:……

Participant(s):……..

Address:…….

Materials required:

1. **Note Book**
2. **Biros**
3. **Voice recorder**
4. **Digital camera**

Introduction

My name is Peter Bosip and I am from Jiwaka Province, Papua New Guinea. I have had twelve years of working experience with number of national and international non-governmental organizations in promoting community initiated sustainable development project throughout PNG until I accepted a scholarship from the New Zealand Government to take up a postgraduate studies. I have a lot of experience traveling to many places across PNG and learned a great deal of customary experiences. Also had an opportunity to learn how other people in PNG live and the general way of life for Papua New Guineans.

Currently, I am enrolled as a Masters of Science student at the University of Canterbury, New Zealand. I am conducting this study to assess how we Papua New Guinea community, our government and other stakeholders are responding to impact of climate change. As part of this study, I am gathering data on **current climate change adaptation programmes/project implementation practices, challenges, and ways in which you hope to ensure your community can be able to cope with any risk posed by the changing climate in future.**

This interview should take **approximately 120 minutes**. Please answer the questions to the best of your ability. I will require your permission to audiotape the interview, but your identity will never be revealed, or connected in any way to your comments. While I may report quotes collected during this interview, at no time will I connect those comments with any individual unless you wish to have your identity revealed. You are free to stop participating or withdraw at any time. Let me know if you would like to skip a question because you don't know how to respond to it. May I turn on the audiotape now?

Opening question

Maybe we can start by you telling me a little bit about yourself, and how long you've been working here while holding this position (5 minutes).

Transition question

- Before I go to OnaKeto project, could you please tell me a little about what OnaKeto's work in the community? What are the objectives and how it is going about achieving these objectives?
- What do you think as the most important thing your organization is doing for your community/PNG as a whole? Why do you say this?

Main questions

Objective 1: Investigating the climate change knowledge and issues at international, national and community levels.

Questions

a. What is your understanding of climate change?
b. How did you get to know the issue of climate change and the impact it will have on your livelihood?
c. What are some of the climate change related issues that you are aware of locally?
d. How good is your understanding of other key climate change action players? And what is your relationship with any of these international, national and local players?

Objective 2: Understanding the adaptation strategies that the funding agencies, national government agencies, NGOs and government program offices and the local communities have for implementation in PNG.

Questions

a. What are your organizational plans to address climate change issues?
b. For how long has your organization been involved in addressing climate change issues?
c. What variables are more important in the community engagement in climate change adaptation projects?
d. Apart from your own group's work programme, how complementary is your work with the other key stakeholders in PNG's strive towards addressing climate change issues?
e. In what areas of climate change adaptation work is your group mainly focused on?

Objective 3: Identifying the most important variables that can make vulnerable communities in PNG to be more responsive to climate change in the future.

Questions

a. Based on your experiences, what were some of the success stories? And what are some of the problems in the strategy implementation?
b. What do you think are the most important variables that can make climate change more adaptable in the future for PNG?

2. Interview with focus groups (Women, Youth and Church representatives, Village Trainers/Project Advisory groups, Ward Councillors)

Date:…..July 2011

Time:……..

Venue:……

Participant(s):……..

Address:…….

Materials required:

i. **Note Book**
ii. **Biros**
iii. **Voice recorder**
iv. **Digital camera**

Introduction

My name is Peter Bosip and I am from Jiwaka Province, Papua New Guinea. I have had twelve years of working experience with number of national and international non-governmental organizations in promoting community initiated sustainable development project throughout PNG until I was offered a scholarship from the New Zealand Government to take up a postgraduate studies.

Currently, I am enrolled as a Masters of Science student at the University of Canterbury, New Zealand. I am conducting this study to assess how the Papua New Guinea community, the government and other key stakeholders are responding to impact of climate change. As part of this study, I am gathering data on **current climate change adaptation programmes/project implementation practices, challenges, and ways in which respective groups hope to ensure the vulnerable communities are protected and can be able to cope with any risk posed by the changing climate in future.**

This questionnaire would take up to at least an hour of your time and I would be grateful if you would participate in this research. Your participation is important.

Please be assured that particular care will be taken to ensure the confidentiality of all data gathered for this study but choices will be given to publish names of the participants in all publications of the findings. All data is to be securely stored at the University of Canterbury during the time of this study. Please also note that participation in the study is voluntary. If you do participate, you have the right to decline to answer any questions and to withdraw from the study at any time prior to publication.

You will receive a summary of the results of this study when it becomes available at the end of the study.

This focus group interview should take **approximately 180 minutes**. Please answer the questions to the best of your ability. If you agree, I will audiotape the interview, but your identity will never be revealed, or connected in any way to your comments. While I may report quotes collected during this interview, at no time will I connect those comments with any individual. You are free to stop participating or withdraw at any time. Let me know if you would like to skip a question because you don't know how to respond to it.

May I turn the audiotape now?

Opening question

Tell me about yourself and your family.

Transition questions

- Since I am not familiar with your village or community, how would you describe your place to any visitor? What is the community like?
- How do you feel the things have changed for the community from the past? And why do you say this?
- Now as you know I am interested in finding out about how the PNG government's climate change programmes have been implemented to date with rural communities, but before I talk about that, can you tell me how the project came about, and since when did you get involved in this project?

Main questions

Objective 2: Understanding the adaptation strategies that the funding agencies, national government agencies, NGOs and government program offices and the local communities have for implementation in PNG.

Questions

a. In what areas of climate change adaptation work is your group mainly participates in?
b. What is your experience on the type of support you get from outsiders such as government, NGO, and individual for your work?

Objective 3: Identifying the most important variables that can make climate change more adaptable in future.

Questions

a. What do you think are the most important things that can make people more responsive to climate change in the future for PNG?

Final questions

4. In what overall ways, if any, **have you seen climate change adaptation projects achieving some expected results**?

If there, miraculously, is any time left, ask*:*
5. Finally, what other general comment have you had with regard to your project so far?

Thank you very much for your time and participation!

Appendix 4- 3: In-depth interview questions sample

1. Structured interview questions for Community project managers and NGO project managers

Objective 1: Investigating the climate change knowledge and issues at international, national and community levels.

Questions

a. What is your understanding of climate change?
b. How did you get to know the issue of climate change and the impact it will have on your livelihood?
c. What are some of the climate change related issues that you are aware of locally?
d. How good is your understanding of other key climate change action players? And what is your relationship with any of these international, national and local players?

Objective 2: Understanding the adaptation strategies that the funding agencies, national government agencies, NGOs and government program offices and the local communities have for implementation in PNG.

Questions

a. What are your organizational plans to address climate change issues?
b. For how long has your organization been involved in addressing climate change issues?

c. What variables are more important in the community engagement in climate change adaptation projects?
d. Apart from your own group's work programme, how complementary is your work with the other key stakeholders in PNG's strive towards addressing climate change issues?
e. In what areas of climate change adaptation work is your group mainly focused on?

Objective 3: Identifying the most important variables that can make vulnerable communities in PNG to be more responsive to climate change in the future.

Questions

a. Based on your experiences, what were some of the success stories? And what are some of the problems in the strategy implementation?
b. What do you think are the most important variables that can make climate change easier to respond to in the future for PNG?

2. Structured interview questionnaires for Community Groups:-Church, Youth, Women and Project Advisory Group

Objective 1: Investigating the climate change adaptation experiences and issues at the community levels.

Questions

a. What is your experience of climate change projects that you are involved in at the moment?
b. Any success stories or how did you get involved and see the changes the project brings about?

Objective 2: Understanding the adaptation strategies that the funding agencies, national government agencies, NGOs and government program offices and the local communities have for implementation in PNG.

Questions

a. In what areas of climate change adaptation work does your group mainly participate in?
b. What is your experience on the type of support you get from others such as government, NGO, and individual for your work?

Objective 3: Identifying the most important variables that can make communities more responsive to climate change in future.

Questions

a. What do you think are the most important things that can make people more responsive to climate change in the future for PNG?

Final questions

4. In what overall ways, if any, **have you seen climate change adaptation projects achieving some expected results**?

If there is any time left, ask:
5. Finally, what other general comment do you have with regard to your project so far?

Thank you very much for your time and participation!

Appendix 4- 4: Questionnaire for international funding agencies, NGOs, government department of PNG and their programme offices online

1. Please write the name of your department, institution, organization and office that you represent in the box with your position/role at the present. If you are acting in this position, please indicate it also.

1_____
2_____

I wish to understand the knowledge and issues relating to climate change at the international, national and community level that you are aware of, and involved in.
2. Since climate change has become increasingly a global phenomenon that threatens all aspect of human wellbeing in recent years, how would you rate your level of understanding of this issue? (please tick **one** only)

☐ Not very much

☐ Quite knowledgeable

☐ Very well verse with the issue

If you are 'Quite knowledgeable' or 'Very well versed with the issue', what are the three most important issues that are threatening our wellbeing?

1)_____2)_____and, 3)_____

I wish to understand the adaptation/mitigation strategies that the international funding agencies, national government departments, government commissioned programme offices, NGOs and local communities have for implementation in Papua New Guinea.

3) To date, there are number of agreements and actions undertaken by governments, political leaders, institutions, organizations and local community groups. Which statement best describes your group's role in addressing climate change issues? (please tick **those** that are applicable to your group's engagement)

- ☐ Provide funding support
- ☐ Collaborate and establish bilateral/multilateral agreements
- ☐ Research and develop policy framework
- ☐ Support implementation of climate change adaptation projects
- ☐ Directly involve in climate change adaptation projects

4. For how long have your group been involved in climate change adaptation and mitigation programme? (please tick **one** only)

- ☐ One year or less
- ☐ Two to four years
- ☐ Five years or more

5. What things/variables are more important in the engagement of community in climate change adaptation projects? (you can tick more than one answer)

- ☐ Raising awareness on the socio-economic vulnerability of the community
- ☐ Providing adequate financial and technical support
- ☐ Enabling communities to make informed decisions to initiate and manage climate change projects

I wish to understand the most important variables that can make climate change more adaptable in future for PNG.

6. Based on your experiences in development and implementation of climate change mitigation/adaptation strategies, how would you rate your group's success rate? (please tick one only and give brief reason in the space provided)

☐ Low

☐ Medium

☐ High

Reason:_____
_____
_____
_____

7. What would be the most important thing that can make climate change more adaptable in the future for PNG? (you can tick **more than one** variable)

☐ Adequate funding and technological support in a timely manner

☐ Encourage and support community initiated projects

☐ Promote and support climate change adaptation projects that proved successful elsewhere within the region

8. Please give any other comments you wish on the issue of making people in Papua New Guinea adapting well to climate change in future.

_____
_____
_____
_____
_____
_____
_____
_____

Thank you for your help.

Appendix 4- 5: Human Ethics Committee Approval

University of Canterbury Private Bag 4800, Christchurch 8140, New Zealand. **www.canterbury.ac.nz**

HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2011/23

13 May 2011

Peter Bosip
Department of Geography
UNIVERSITY OF CANTERBURY

Dear Peter

The Human Ethics Committee advises that your research proposal "Assessing the effectiveness of climate change programmes and project implementation in Papua New Guinea" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 10 May 2011.

Please note that this approval is subject to the following:

- A copy of raw data should be kept by the Department for five years and then destroyed.
- In the statement on withdrawal, please expand to include the statement that "the withdrawal of participation will not affect any ongoing or future relationship with NGOs".

In order to complete HEC records, please forward an electronic copy of all amended documents.

Best wishes for your project.

Yours sincerely

Michael Grimshaw
Chair University of Canterbury Human Ethics Committee

Appendix 4- 6: Explanatory notes to questionnaires

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Department of Geography

Tel: 02102942581
Email: pkb36@uclive.ac.nz

Dear Sir/Madam,

Subject: Introduction to the survey questionnaire

My name is Peter Bosip and I am from Jiwaka Province, Papua New Guinea. I have had twelve years of working experience with number of national and international non-governmental organizations in promoting community initiated sustainable development project throughout PNG until I was offered a scholarship from the New Zealand Government to take up a postgraduate studies.

Currently, I am enrolled as a Masters of Science student at the University of Canterbury, New Zealand. I am conducting this study to assess how the Papua New Guinea community, the government and other key stakeholders are responding to impact of climate change. As part of this study, I am gathering data on **current climate change adaptation programmes/project implementation practices, challenges, and ways in which respective groups hope to ensure the vulnerable communities are protected and can be able to cope with any risk posed by the changing climate in future.**

This questionnaire would take up to at least an hour of your time and I would be grateful if you would participate in this research. Your participation is important.

Please be assured that particular care will be taken to ensure the confidentiality of all data gathered for this study but choices will be given to publish names of the participants in all publications of the findings. All data is to be securely stored at the University of Canterbury during the time of this study. Please also note that participation in the study is voluntary. If you do participate, you have the right to decline to answer any questions and to withdraw from the study at any time prior to publication.

You will receive a summary of the results of this study when it becomes available at the end of the study.

However, should you have any questions about this research or the consent form, please do not hesitate to contact me on email pkb36@uclive.ac.nz or mobile + 64 02102942581 or contact my supervisor Prof. Eric Pawson on email eric.pawson@canterbury.ac.nz

Thank you in advance for your invaluable contribution.

Yours sincerely

Appendix 6- 7: Information sheet & Consent form for participants

a) Information sheet to the consent form

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Department of Geography

Tel: 023102942581,
Email:
pkb36@uclive.ac.nz

…….
…….
……

…..July 2011

Dear……..,

Re: Information sheet to the Consent Form

My name is Peter Bosip and I am from Jiwaka Province, Papua New Guinea. I have had twelve years of working experience with number of national and international non-governmental organizations in promoting community initiated sustainable development project throughout PNG until I accepted a scholarship from the New Zealand Government to take up a postgraduate studies. I am currently enrolled as a Masters student and I am conducting this study to find out what your community or group is doing as a response to protect yourself from being severely impacted by the current changing climate. As part of this study, I am gathering data on **current climate change adaptation project implementation practices, challenges, and ways in which you**

hope to ensure your community can be able to cope with any risk posed by the changing climate in future.

However, to conduct such a research the University of Canterbury has a strong human ethics principle as to how the information is gathered and shared in order to protect the integrity of participants in such research. To adhere to the university's human ethics obligations, I have provided a separate sheet titled "Declaration of Consent to Participate" that you as leader of your group would need to read and sign so this can form the basis of your agreement to participate. There is space on the form for other member of the group to sign when we meet face to face. Also there is another information sheet that states about what can be done with the information collected and where it will be stored.

Please read these two sheets carefully and then sign the consent form as outlined in the sheet provided.

If there are any questions surrounding the signing of the consent form or the research, please do not hesitate to contact me or my Supervisor Professor Eric Pawson at eric.pawson@canterbury.ac.nz or phone + **64 3 364 2930.**

Yours sincerely

b) Consent form for in-depth interviews

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Department of Geography

Tel: +64 02102942581
Email: pkb36@uclive.ac.nz

Research topic: Assessing the effectiveness of climate change programmes and projects implementation in Papua New Guinea

Declaration of Consent to Participate

I have read and understood the following information provided about this research project.

1. that my participation is voluntary and that I may withdraw at any time prior to publication of the findings.

2. that any information or opinions I provide will be kept confidential by the researcher however, if I wish to, I will have the choice of being named or being anonymous in the report,

3. that all data from this research will be stored securely at the University of Canterbury during the time of this study,

4. that I will see and approve the brief of the transcribed note of the interview before the actual transcription of this study, and

5. the findings of this research could be presented at conferences and written up in academic or any journals.

By signing below, I as Ward Member/Project Manager of my community agree to participate in this research.

Name: 1._____ Signature: _____

Date: _____

I would like to be named/anonymous (cross out one) in the completed report.

*The **completed consent form** will be collected at the time of the interview.*

Thank you for your invaluable contribution to this study.

c) Consent form for online questionnaire participants

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Department of Geography

Tel: 02102942581
Email: pkb36@uclive.ac.nz

…….
…….
……

…..July 2011

Dear……..,

Re: Assessing the effectiveness of climate change programmes and projects implementation in Papua New Guinea

My name is Peter Bosip and I am from Jiwaka Province, Papua New Guinea. I have had twelve years of working experience with number of national and international non-governmental organizations in promoting community initiated sustainable development project throughout PNG until I accepted a scholarship from the New Zealand Government to take up a postgraduate studies. I have a lot of experiences traveling to many places across PNG and learned a great deal about Papua New Guineans way of life.

Currently, I am enrolled as a Masters student at the University of Canterbury, New Zealand. I am conducting a study to assess how we Papua New Guinea community, our government and other stakeholders are responding to impact of climate change. As part of this study, I am gathering data on **current climate change adaptation project implementation practices, challenges, and ways in which you hope to ensure your community can be able to cope with any risk posed by the changing climate in future.**

The interview would take up to at least two hours of your time and I would be grateful if you would indicate your wish to participate in this research. Your participation is important.

Please be assured that particular care will be taken to ensure the confidentiality of all data gathered for this study but choices will be given to publish names of the participating individual or respected persons of a community in all publications of the findings. All data is to be securely stored at the University of Canterbury during the time of this study. Please also note that participation in the study is voluntary. If you do participate, you have the right to decline to answer any questions and to withdraw from the study at any time prior to publication.

You will receive a summary of the results of this study when it becomes available at the end of the study.

The consent form will be collected at the time of the first formal interview.

However, should you have any questions about this research or the consent form, please do not hesitate to contact me on email pkb36@uclive.ac.nz or mobile + 64 02102942581 or contact my supervisor Prof. Eric Pawson on email eric.pawson@canterbury.ac.nz

Thank you in advance for your invaluable contribution.

Yours sincerely